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Welcome message



Hun-Jong Dhong, M.D., Ph.D.

President, International Congress of ORL-HNS 2018

Distinguished members of Korean Society of Otorhinolaryngology-Head and Neck Surgery,

It is our honor and pleasure to invite you to International Congress of ORL-HNS 2018 in conjunction with 92nd Annual Congress of Korean Society of Otorhinolaryngology-Head and Neck Surgery / 2018 Spring Meeting of Korean Association of Otorhinolaryngologists.

As all the medical fields have become segmented, otorhinolaryngology in Korea also has been comprised of an academic division and a related society developing vigorous academic activities. However, the Annual Congress of Korean Society of Otorhinolaryngology-Head and Neck Surgery and Spring Meeting of Korean Association of Otorhinolaryngologists held every April is a place for a meeting and a festival to enhance the overall understanding of otorhinolaryngology that easily becomes disconnected after the time of resident, increase the unity between the members who work in different type of professions and jobs, and promote our status and rights specialized in otorhinolaryngology.

Making the success of the 20th IFOS World Congress in 2013 a stepping stone, we recognized the status of otorhinolaryngology in Korea and have been sharing the research achievements and academic results of our members with the overseas scholars since we held the Annual Congress of Korean Society of Otorhinolaryngology-Head and Neck Surgery as an international congress in 2014 and are taking a powerful step as a leading global society. This Congress will also become a more meaningful event as the International Congress of ORL-HNS 2018 will be held at the same time.

There are many hardships in “raising the value of otorhinolaryngology,” the slogan of our Society, due to the external restrictions and unreasonable medical conditions, but we have to raise our value with our unified efforts on our own instead of blaming external environment. We have to acquire the latest knowledge and share our vision through communication and harmony between members in order to provide the best treatment in ear, nose, head, and neck to people and pursue our fair rights winning public confidence at the same time. As the first step to enhance our value, we encourage your full participation in the congress.

I would like to extend the words of appreciation and praise to the chairman, the board of directors Chae-Seo Rhee of Korean Society of Otorhinolaryngology-Head and Neck Surgery and President Byeong-Ho Song of Korean Association of Otorhinolaryngologists who spared no strenuous efforts in preparing this congress, and Director of scientific committee Yoon Woo Koh and the members of the scientific committee, and other directors concerned who has a hard time for the successful opening of the event. I want to thank all the members again for your devotion and participation.

Welcome message



Byeong-Ho Song, M.D., Ph.D.

President, Korean Association of Otorhinolaryngologists

Honorable members of Korean Society of Otorhinolaryngology-Head and Neck Surgery and Korean Association of Otorhinolaryngologists,

It is my pleasure to say words of greetings to you on the occasion of holding the International Congress of ORL-HNS 2018 in conjunction with 92nd Annual Congress of Korean Society of Otorhinolaryngology-Head and Neck Surgery / 2018 Spring Meeting of Korean Association of Otorhinolaryngologists. The spring meetings has been held as an international congress since 2014. It is the confidence in the international congress and the world-widely acknowledged capability and level of our Association after the successful hosting of IFOS in 2013 that made this possible.

The number of registration tends to drop because some of the members have experienced a certain awkwardness in the program performed in English since the event became an international congress, but the Sunday program of the Korean Association of Otorhinolaryngologists is conducted in Korean and is offering an enjoyable and instructive schedule with the selective subjects required for the hospital management and treatment. An Ultrasound Live Hands-On has been held every spring and autumn since 2017. As the 3rd Ultrasound Live Hands-On is planned in the type of practical training in this Congress again, I believe it will be very useful for those who are in the primary medical care.

I would like to thank Hun-Jong Dhong, President of the congress, Chae-Seo Rhee, Chairman, the board of directors and members of the scientific committee, and other directors, and vice president of scientific committee Jae Jin Choi and the members of the Korean Association of Otorhinolaryngologists who were painstaking with preparing this event. Unlike the Congress of Korean Association of Otorhinolaryngologists held in January, the spring congress is a place for a meeting to be with senior and junior medical staff as well as the professors of the medical school. I look forward to seeing all the distinguished members in the Congress in April when spring is in full bloom.

Organization

Organizing Committee

Congress President	Hun-Jong DHONG
President, KAO	Byeong-Ho SONG
Chairman, Board of Directors, KORL-HNS	Chae-Seo RHEE
General Secretary	Ja-Won KOO
Director, Treasur Committee	Il Woo LEE
Public Relations, International	Shi Nae PARK
Public Relations, Domestic	Mi Kyung YE
Director, KAO	Gang Cheol SHIN
Director, Scientific Committee	Yoon Woo KOH
Director, Social Program	Sung Won CHAE
Vice-Director, Scientific Committee	Jae-Yol LIM

The Board of Directors

Chairman	Chae-Seo RHEE
Vice Chairman	Kwang-Yoon JUNG
	Il Hee HONG
General Secretary	Ja-Won KOO
Director, Board Exam Committee	Kwang-Jae CHO
Director, Resident Training Committee	Seung-Ho CHOI
Editor	Kyoung Ho PARK
Director, Scientific Committee	Yoon Woo KOH
Director, Treasur Committee	Il Woo LEE
Director, Medical Insurance Committee	Seung Hoon LEE
	Sei Young LEE
Director, Medical Affairs Committee	Jin Kook KIM
Director, Public Relations	Mi Kyung YE
Director, Planning Committee	Jun Ho LEE
Director, Medical Practitioner Committee	Gang Cheol SHIN
Director, Legislation Committee	Sang Chul LIM
Director, Education Research Committee	Sung Won CHAE
Director, International Affairs	Shi Nae PARK
Director, Social Responsibility	Il Seok PARK

Scientific Committee

Director, Scientific Committee	Yoon Woo KOH
Vice-Director, Scientific Committee	Jae-Yol LIM
Scientific Committee Members	Seung Kuk BAEK
	Kyu-Sup CHO
	Byung Yoon CHOI
	Man Ki CHUNG
	Hyun Jun HONG

Scientific Committee Members	Chan Ho HWANG
	Young Hoon JOO
	Chang-Hoon KIM
	Chul-Ho KIM
	Dong-Young KIM
	Sung Huhn KIM
	Sung Won KIM
	Tae Hoon KIM
	Ja-Won KOO
	Jong Dae LEE
	Kun Hee LEE
	Kyu-Yup LEE
	Sang Hyuk LEE
	So Yoon LEE
	Jung Je PARK
	Shi Nae PARK
Advisory	Yang-Sun CHO

Korean Association of Otorhinolaryngologists

President	Byeong Ho SONG
Auditor	Chang Sik PARK
	Gi Hwan KIM
Vice president, General Secretary Committee	Chang Joon HAN
Director, General Secretary	Byung Chul KIM
Director, Treasury	Youn Kyu LEE
Director, Corporate Relations	Dong Sun PARK
Director, Project	Gu Il RHIM
Director, Policy	Sang Ho PARK
Director, Medical Affairs	Dong Kyun HONG
	Yong Hun RHO
Director, Social Council	Sun Ok YOON
Director, Legislation	Joong Wook SHIN
Vice president, Scientific Committee	Jae Jin CHOI
Director, Education	Chan Ho HWANG
Director, Scientific	Hyun Jong LEE
	Jae Kook OH
	Woo Jin CHO
Vice president, Public Relations Committee	Seon Tae PARK
Director, Public Relations	Gwang Cheol SHIN
	Jong Sun LEE
	Jun Hee KIM
	Young Ju CHO
Vice president, Medical Insurance Committee	Que Chic KIM
Director, Medical Insurance	Dong Hyuk HAN
	Jong Bin KIM
	Joo Hwan KIM
	Young Jin AHN

■ Congress Information

Congress Venue

- Grand Hilton Hotel & Convention Center, Seoul, Korea
- Please refer to the floor plan in the program book.

Registration Desk

Congress Registration

- Location: Convention Center (4F)
- Operating Hour: April 28 (Sat): 07:00~17:00
April 29 (Sun): 07:00~17:00

Gala Dinner

Dinner Coupon is attached on the name tag. Please submit your coupon when you enter room.

- Date & Time: April 28 (Sat), 18:00~
- Location: Convention Hall A – C, Convention Center (4F)

Luncheon

Lunch Coupon is attached on the name tag. Please keep in mind that the name tag & **Coupons** cannot be re-issued.

- Date & Time: April 28 (Sat), 12:30~13:30
- Location: Convention Hall A, B, C
- Date & Time: April 29 (Sun), 12:40~13:30
- Location: Convention Hall A, B, C
- Date & Time: April 29 (Sun), 12:40~13:30
- Location: Emerald Hall A – B

Award Ceremony

Opening Ceremony : Academic Achievement Award, DAIN Leading Research Award, Seok Dang Best Research Paper Award, Resident Paper Award, Award for Humanitarian Service, Excellent Branch Award

Closing Ceremony : Best Oral & Poster Presentation, Travel Grant Awards

Special Notices at the ICORL 2018

It is strictly prohibited to take a photo or video for the lecture contents.

Please turn off or switch to vibrate your cell phone within the session room.

■ 학술대회 평점 유의사항 안내

대한의사협회의 연수교육 관리 방침 변경(대의학 제2016-1호)에 따라 학술대회 출결관리 강화를 위하여 학술대회 시작과 종료를 확인할 수 있도록 일 2회의 출결 확인을 하고, 체류 시간에 따라 부분평점을 발급합니다. 반드시 명찰을 발급 받으시고 토요일, 일요일 매일 일 2회 출결 확인을 하여 주시기 바랍니다.

출결 확인 방법

등록처 및 컨벤션센터 4층과 3층 로비 공간에 비치된 바코드 리더기에 명찰 내에 출력되어 있는 바코드를 접촉.

※ 토요일, 일요일 매일 일 2회의 접촉

※ 일 1회의 접촉 또는 일 2회의 접촉 시간이 2시간 미만일 경우 연수 평점이 부여 되지 않음.

부분평점 인정 기준(6평점 기준)

일 2회의 접촉 시간이

2시간 초과 ~ 3시간 이하 ⇒ 3평점 인정

3시간 초과 ~ 4시간 이하 ⇒ 4평점 인정

4시간 초과 ~ 5시간 이하 ⇒ 5평점 인정

5시간 초과 ~ ⇒ 6평점 인정

※ 토요일, 일요일 각각 5시간 초과로 매일 2회씩 총 4회의 바코드를 접촉하여야 최대 12평점 인정

Award Winners

Academic Achievement Award (학술상)



Chul-Ho KIM (Ajou Univ.)

Professor Chul-Ho Kim graduated from Inha University in 1993. He works for Ajou University as a head and neck surgeon and also oncologist. He is endowed with Academic Achievement Award at ICORL 2018, in recognition of his consistent and enthusiastic dedications for the development of the KORL-HNS in administrative as well as academic field for last 5 years.

DAIN Leading Research Award (다인 선도연구자상)



Byung Yoon CHOI (Seoul National Univ.)

Professor Byung Yoon Choi is working for Bundang Seoul National University hospital since his graduation of Seoul National University in the year of 1998. In recognition of his excellency in academic achievement, he is endowed with Leading Research Award at ICORL 2018. For last 5 years, as many as 37 scientific papers have been published under his major authorship in SCI(E) journals, corresponding of a total Impact Factor of 84.1.6

Seok Dang Best Research Paper Awards (석당우수논문상)



The 1st Prize
Kwang Yoon JUNG (Korea Univ.)

Predicting Extrathyroidal Extension in Patients With Papillary Thyroid Microcarcinoma According to a BRAF Mutation.



The 2nd Prize
Il-Joon MOON (Sungkyunkwan Univ.)

Minimally Invasive Transcanal Removal of Attic Cholesteatoma.



The 3rd Prize
Young Hyo KIM (Inha Univ.)

Cold Dry Air Provocation and Immunoglobulin E in Nasal Fluid for Diagnosing Nonspecific Hyper-Reactivity.

Best Resident Paper Awards (전공의 우수연제상)

Otology: **Seung Hun LEE** (Chung Nam National Univ.)

Changes of Cochlea Glucocorticoid Receptor and Serum Corticosterone in Noise Induced Hearing Loss Animal Model A Comparison of Administration Time of Dexamethasone

Head and Neck Surgery: **Yang-Ho LEE** (Chung-Ang Univ.)

An Evaluation of Uncertainty for Voice Assessment

Rhinology: No Candidate

Recognition Award for Senior Members (원로회원 특별상)



Hee Nam KIM (하나이비인후과병원)

1944년생
1969년 연세대학교 의과대학 졸업
연세대학교 의과대학 명예교수
미국 오하이오 주립의대 명예교수
전 이과연구회 회장/전 대한청각학회 회장
전 세브란스 안이비인후과 병원장
전 대통령 및 가족의 의료자문의
전 대한이비인후과학회 이사장

Award for Humanitarian Service (사회 봉사상)



Hae Song KIM (Kim Haesong ENT)

Dr. HS Kim became an otolaryngologist in 1990 after graduating from Chonnam National University Medical School in 1986. While working as a protection commissioner at the Gwangju Youth Detention Center of the Ministry of Justice for more than 21 years since 1996, he has been leading the inmates of the Youth Detention Center into the right path donating many testing equipment as well as the otolaryngology clinic inside the center. Moreover, starting from the medical treatment at the Gaeseong Industrial Complex in 2008, he is currently the chairman of the planning committee at the Good Doctors, the NGO, and is preparing for the local care in North Korea and is moving forward for the medical treatment and humanitarian support for the North Korean defectors.

CODE Guideline

Excellent Branch Award (우수지부상)

부산 · 울산 · 경남지부(Busan · Ulsan · Gyeongnam Branch)

Travel Grant Award

For young colleagues from overseas who submit outstanding abstracts as decided by the scientific committee. (<40 years of age)

Otology: **Osama Mohammed HASSAN** (Cairo Univ. College of Medicine, Egypt)
Inlay versus Underlay Cartilage Tympanoplasty for Chronic Inactive Mucosal Otitis Media

Rhinology: **Ahmed Mahmoud EL-BATAWI** (Kasr Alainy Teaching Hosp., Faculty of medicine, Cairo Univ., Egypt)
Olfactory function in patients with chronic rhinosinusitis before and after functional endoscopic sinus surgery

Head and Neck Surgery:

Karan GUPTA (Fortis Memorial Research Institute, India)
Oncological outcome following intensification of treatment by Transoral robotic surgery (TORS) for HPV negative Stage IV Oropharyngeal cancer A prospective trial

Mahajan ABHISHEK (Tata Memorial Hospital, India)
Imaging of Neck Node Metastases in Well Differentiated Thyroid Cancers Is CT Boon or Bane?

Best Oral Presentation Award

Six winners, two persons per specialty will be selected through a rigorous review in oral presentation sessions.

Best Poster Presentation Award

A winner in each specialty will be selected through a rigorous review in poster presentation sessions.

Specialties

OT	Otology
RH	Rhinology
HN	Head & Neck Surgery
ORL	Society Program & Combined Program
SLP	Speech and Language Pathologists
CL	Clinicians

Scientific Committee

KL	Keynote Lecture
SL	Special Lecture
SP	Symposium
IC	Instruction Course
VL	Video Lecture
HO	Hands-on Course
IM	Interest Group Meeting
OP	Free Paper (Oral Presentation)
PP	Free Paper (Poster Presentation)
PX	Free Paper (Poster Exhibition)

How to Understand the Abbreviation

Connect the letters of Specialties and Session Abbreviations & Types mentioned above. For example,

OTSP	Otology Symposium
RHOP	Rhinology Oral Presentation
HNHO	Head & Neck Surgery Hands-on Course
OTIC	Otology Instruction Course

Official Program

April 27 (Fri)

ORL 지도전문의교육 14:00 ~ 18:00

RM 3-1 (Emerald A), Convention Center (3F)

ORL 전공의연수강좌 10:00 ~ 17:00

Chung-Ang Univ. Hospital

Interest Group Meeting 14:00~18:00

Function Rooms, Grand Hilton Hotel (2F)

Welcome Reception 18:00 ~ 20:00

RM 3-3 (Diamond), Convention Center (3F)

April 28 (Sat)

Opening Ceremony (Awards Ceremony) 09:00 ~ 09:20

RM 4-2 (Convention B), Convention Center (4F)

Plenary Session 09:20 ~ 10:00

RM 4-2 (Convention B), Convention Center (4F)

Chair: Hun-Jong DHONG (Sungkyunkwan Univ.)

4천만명 행태/기호 Big Data를 우리는 어떻게 활용할 것인가?

구교식 (와이더플래닛 대표)

Congress Photo 10:00 ~ 10:10

RM 4-2 (Convention B), Convention Center (4F)

Exhibition Ribbon Cutting 10:10 ~ 10:20

Exhibition Hall A, Convention Center (1F)

Korean ORL-HNS & Asean ORL-HNF MOU Signing Ceremony (MOU signing ceremony between Korean Society of Otorhinolaryngology-Head and Neck Surgery and ASEAN Otorhinolaryngological- Head and Neck Federation) 10:30 ~ 11:00

RM 2-4 (Swan), Grand Hilton Hotel (2F)

Senior Member Luncheon 12:30 ~ 13:30

RM 2-6 (Peacock), Grand Hilton Hotel (2F)

CEO Journal's 10th Anniversary Ceremony 15:50 ~ 17:40

RM 2-1 (Flamingo), Grand Hilton Hotel (2F)

Congress Banquet 18:00 ~

Convention Hall A-C, Convention Center (4F)

April 29 (Sun)

Korean ORL-HNS & Taiwan Society ORL-HNS MOU Signing Ceremony (MOU signing ceremony between Korean Society of Otorhinolaryngology-Head and Neck Surgery) and Taiwan Society of Otorhinolaryngology Head and Neck Surgery) 10:50 ~ 11:10

RM 2-4 (Swan), Grand Hilton Hotel (2F)

총회 (General Assembly) 12:40 ~ 13:30

RM 4-1 (Convention A), Convention Center (4F)

Closing Ceremony (Awards Ceremony) 16:50 ~

RM 4-2 (Convention B), Convention Center (4F)

Scientific Program

April 28 (Sat) Otology

[OTKL I] Keynote Lecture

10:30~11:00

RM 4-1 (Convention A)

Chair : Seung Ha OH (Seoul National Univ.)

Current diagnosis and management of congenital CMV related hearing loss

Kenneth H. LEE

(Univ. of Texas Southwestern Medical Center, USA)

[OTSP I] Where are Otologists Now in the Genomics-Based Precision-Medicine Era?

11:00~12:30

RM 4-1 (Convention A)

Chair : See Ok SHIN (Chungbuk National Univ.),
Takehiko UYEYAMA (Kobe Univ., Japan)

What does newborn genetic screening for hearing impairment provide to otologists a mine of future information or pandoras box

Chen-Chi WU (National Taiwan Univ., Taiwan)

Hearing loss causing from impaired actin dynamics clinical implications

Takehiko UYEYAMA (Kobe Univ., Japan)

Is a gene-therapy-era for hearing loss just around the corner?: Expectations and limitations

Kyu-Yup LEE (Kyungpook National Univ.)

Does genetic diagnosis substantially influence clinical practice in cochlear implantation? How and when?

Byung Yoon CHOI (Seoul National Univ.)

Can we attenuate progressive hearing loss by knowing its genetic etiology

Jinsei JUNG (Yonsei Univ.)

[OTKL II] Keynote Lecture

13:30~14:00

RM 4-1 (Convention A)

Chair : Yong Bum CHO (Chonnam National Univ.)

The genetic background of the patients with cochlear implantation

Shin-ichi USAMI (Shinshu Univ., Japan)

[OTSP II] Expansion of the Indication of Cochlear Implantation: Recent Updates

14:00-15:30

RM 4-1 (Convention A)

Chair : Sung Hwa HONG (Sungkyunkwan Univ.),
Barrie Yau Boon TAN (Singapore General Hosp., Singapore)

Venturing into the new and expanded frontiers - cochlear implantation in single sided deafness arising from sudden sensorineural hearing loss - A novel form of treatment

Barrie Yau Boon TAN (Singapore General Hosp., Singapore)

Partial deafness and cochlear implantation adults and children

Shin-ichi USAMI (Shinshu Univ., Japan)

Cochlear implantation in severe inner ear anomalies

Lee Suk KIM (Dong-A Univ.)

Single side deafness with intractable tinnitus

Seung Ha OH (Seoul National Univ.)

Surgical intervention for auditory neuropathy: When, why, and to whom?

Yun-Hoon CHOUNG (Ajou Univ.)

[OTSP III] State-of-the-art Surgical Techniques in Otologic Surgery

15:50-17:20

RM 3-1 (Emerald A)

Chair : Chul Won PARK (Hanyang Univ.),
Soe TIN (Victoria Hosp., Yangon, Myanmar)

CO2 Laser in stapes surgery

Ja-Won KOO (Seoul National Univ.)

Endoscopic ear surgery

Chin-Kuo CHEN

(Chang Gung Memorial Hosp. and Chang Gung Univ., Taiwan)

Endoscope- assisted microvascular decompression

Jacques MAGNAN

(Univ. Aix Marseille II L'Hôpital Nord, France)

Transcanal endoscopic ear surgery for pediatric patients

Hyong-Ho CHO (Chonnam National Univ.)

Scientific Program

April 28 (Sat) Rhinology

[RHKL I] Keynote Lecture

10:30-11:00

RM 4-2 (Convention B)

Chair : Chul Hee LEE (Chung-Ang Univ.)

Physician wellness

Joseph HAN (Eastern Virginia Medical School, USA)

[RHSP I] Immunity and Pathogenesis of CRS/NP

11:00-12:30

RM 4-2 (Convention B)

Chair : Do-Yeon CHO (Univ. of Alabama at Birmingham, USA),
Seong H. CHO (Div of Allergy-Immunology,
Univ. of South Florida, USA)

Role of superantigens in CRS

Tae Hoon KIM (Korea Univ.)

Mucociliary dysfunction in the pathogenesis of chronic rhinosinusitis

Do-Yeon CHO (Univ. of Alabama at Birmingham, USA)

ILC subsets in asian nasal polyps

Dong-Young KIM (Seoul National Univ.)

The role of epithelium on pathophysiology of rhinosinusitis

Chang-Hoon KIM (Yonsei Univ.)

CRS phenotypes an approach to better medical care for CRS

Seong H. CHO
(Div of Allergy-Immunology, Univ. of South Florida, USA)

[RHKL II] Keynote Lecture

13:30-14:00

RM 4-2 (Convention B)

Chair : Jin Hee CHO (The Catholic Univ. of Korea)

Immunotherapy up-to-date for allergic rhinitis

Yoshitaka OKAMOTO (Chiba Univ., Japan)

[RHSP II] Challenges in Frontal Sinus Surgery

14:00-15:30

RM 4-2 (Convention B)

Chair : Jin Hee CHO (The Catholic Univ. of Korea),
Kornkiat SNIDVONGS (Chulalongkorn Univ., Thailand)

Basics of frontal sinus surgery

Doo Hee HAN (Seoul National Univ.)

Pitfalls and tips for frontal sinusotomy

Yong Min KIM (Chungnam National Univ.)

Endoscopic modified lothrop procedure outside in versus inside out

Kornkiat SNIDVONGS (Chulalongkorn Univ., Thailand)

When & how to do external approaches to frontal sinus

Jin Kook KIM (Konkuk Univ.)

Complications of frontal sinus surgery and its management

David W. JANG (Duke Univ., USA)

[RHSP III] Tips and Pearls of Augmentation Rhinoplasty

15:50-17:20

RM 3-2 (Emerald B)

Chair : Jae Goo KANG (National Medical Center),
Chuan Hsiang Steve KAO (Tri-Service General Hosp., Taiwan)

What materials do you choose for augmentation?

Kun Hee LEE (Kyung Hee Univ.)

Talor-made dorsal augmentation using silicone

Chuan Hsiang Steve KAO (Tri-Service General Hosp., Taiwan)

Long term results of rhinoplasty using diced cartilage

Yong Ju JANG (Univ. of Ulsan)

Pros and cons of using rib cartilage

Hong-Ryul JIN (Dr Jins Premium Nose Clinic)

April 28 (Sat) Head & Neck Surgery

[HNKL I] Keynote Lecture

10:30-11:00

RM 4-3 (Convention C)

Chair : Phil Sang CHUNG (Dankook Univ.)

Influence of tumor heterogeneity in head and neck squamous cell carcinoma on host immune response

John B SUNWOO (Stanford Univ., USA)

[HNKL II] Keynote Lecture

11:00-11:30

RM 4-3 (Convention C)

Chair : Eun Chang CHOI (Yonsei Univ.)

Laryngotracheal reconstruction after the surgery of invasive thyroid cancer

Yach-Shiang LIN
(Kaohsiung Veterans General Hosp., Kaohsiung, Taiwan)

[HNISP I] Recent Advancement of Airway Management

11:30-12:30

RM 4-3 (Convention C)

Chair : Bee See GOH (The National Univ. of Malaysia, Malaysia),
Dong Il SUN (The Catholic Univ. of Korea)

Airway foreign body in children

Jin-Choon LEE (Pusan National Univ.)

Laryngomalacia who will benefits from surgery

Bee See GOH (The National Univ. of Malaysia, Malaysia)

Tracheal resection and end to end anastomosis

Seung-Ho CHOI (Univ. of Ulsan)

Tissue engineered tracheal reconstruction

Seong Keun KWON (Seoul National Univ.)

[HNPD I] Panel Discussion: Salvage Treatment of Recurred Oral Cavity Cancer

13:30-15:30

RM 4-3 (Convention C)

Chair : Min Sik KIM (The Catholic Univ. of Korea),
Sheng Po HAO (Shin Kong Wu Ho-Su Memorial Hosp., Taiwan)

New staging system in oral cavity cancer

Jaegu CHO (Korea Univ.)

Surgical approach for salvage surgery in cases of recurrent oral cavity cancer

Seiichi YOSHIMOTO (National Cancer Center Hosp., Japan)

Salvage neck management for locoregional recurrence

Sheng Po HAO (Shin Kong Wu Ho-Su Memorial Hosp., Taiwan)

Functional reconstruction for recurred cases

Soon-Hyun AHN (Seoul National Univ.)

[HNISP II] Reconstruction and Restoration in Head and Neck

15:50-17:20

RM 3-3 (Diamond)

Chair : Chung-Hwan BAEK (Sungkyunkwan Univ.),
Phakdee SANNIKORN
(Rajavithi Hosp., Ministry of Public Health, Thailand)

Clinical application of 3D bioprinting on craniofacial reconstruction

Jong-Won RHIE (Department of Plastic & Reconstructive Surgery,
The Catholic Univ. of Korea)

Reconstruction procedure for functional restoration in oral cavity cancer surgery

Phakdee SANNIKORN
(Rajavithi Hosp., Ministry of Public Health, Thailand)

Evidence-based application of medical procedures to improve the survival of microvascular flaps

Yoo Seob SHIN (Ajou Univ.)

Reconstruction of pharyngo-esophagectomy defects

Jimmy Yu Wai CHAN (The Univ. of Hong Kong, Hong Kong)

Functional sequalea of the head and neck cancer treatment

Miroslav TEDLA (ENT Dept. of the Comenius Univ.
and Univ. Hosp. Bratislava, Slovakia)

Scientific Program

April 28 (Sat) ORLSP

[ORLSP Audiologist] Practical Instructions and Strategies for Emerging Audiological Assessment

13:30-15:30 *Korean Session

RM 3-1 (Emerald A)

Chair : Seung Hwan LEE (Hanyang Univ.)

Chirp-evoked ABR

Min-Hyun PARK (Seoul National Univ.)

Detection of cochlear dead region TEN test

GiJung IM (Korea Univ.)

Bone conduction hearing test

Yong-Ho PARK (Chungnam National Univ.)

Tinnitusgram

Hyun Joon SIM (Eulji Univ.)

Audiological diagnosis of auditory neuropathy spectrum disorder

Sung-Wook JEONG (Dong-A Univ.)

Cervical and ocular vestibular myogenic potential

Min-Young LEE (Dankook Univ.)

[ORLSP Nurse 1] 흔한 이비인후과 질환에 대한 이해

13:30-15:30 *Korean Session

RM 3-2 (Emerald B)

Chair : 정만기 (성균관대의대), 김태훈 (고려대의대)

성인 경부 악성 종양의 증상, 진단 및 치료

박재홍 (순천향대의대)

비염의 치료 전략-처음부터 끝까지

김용대 (영남대의대)

노인성 난청의 진단과 예방, 치료

김상훈 (경희대의대)

어지럼증의 이과적 원인 및 치료 - 어지럼증 3대 원인

김민범 (가톨릭관동대의대)

코막힘 증상의 다양한 구조적 원인 및 치료

홍석진 (한림대의대)

기관절개술의 적응증 및 수술 후 관리

조정해 (가톨릭대의대)

[ORLSP Nurse 2] 이비인후과 수술의 이해

15:50-16:40 *Korean Session

RM 2-4 (Swan)

Chair : 김성현 (연세의대)

Surgical treatment of vertigo-related diseases

정진세 (연세의대)

Endoscopic skullbase surgery

홍승노 (서울대의대)

Salivary gland surgery (preoperative and postoperative check point)

최정석 (인하대의대)

[ORLSP SLP] Specialty Care for Voice Disorders: Special Know-How from High-End Voice Center

13:30-15:30 *Korean Session

RM 3-3 (Diamond)

Chair : 손영익 (성균관대의대)

How to treat persistent vocal nodule in patients with occupational voice abuse

안철민 (프라나 이비인후과)

Appropriate treatment for vocal fold paralysis according to the different situations

김영호 (아름다운 목소리 이비인후과)

How is spasmodic dysphonia treated key points to reduce symptoms and aid communication

김형태 (예송이비인후과)

Pearls and pitfalls of singing voice therapy for professional voice users

오재국 (보아스 이비인후과)

April 29 (Sun) Otology

[OTSP IV] Hearing Preservation and Restoration in Skull Base Lesion

08:50-10:20

RM 4-1 (Convention A)

Chair : Jong Woo CHUNG (Univ. of Ulsan),
Shin-ichi KANEMARU

(Kitano Hosp., Tazuke Kofukai Medical Research Institute, Japan)

Hearing deterioration in vestibular schwannoma

Jong Dae LEE (Soonchunhyang Univ.)

What strategy should we select for acoustic tumor in difficult case

Shin-ichi KANEMARU
(Kitano Hosp., Tazuke Kofukai Medical Research Institute, Japan)

Hearing restoration in neurofibromatosis type II

Jae Young CHOI (Yonsei Univ.)

Hearing preservation surgery in intracanalicular vestibular schwannoma

Jong Woo CHUNG (Univ. of Ulsan)

Neurological perspective of retrosigmoid approach in vestibular schwannoma

Ki-Hong CHANG (The Catholic Univ. of Korea)

[OTRT I] Chronic Recurrent Suppurative Otitis Media After Surgical Management With or Without Cholesteatoma: How I Do It?

10:40-12:40

RM 4-1 (Convention A)

Moderator : Yang-Sun CHO (Sungkyunkwan Univ.)

Overview

Yang-Sun CHO (Sungkyunkwan Univ.)

Using MRI for surveillance of recurrent cholesteatoma - can you avoid 2nd look surgery

Kenneth H. LEE (Univ. of Texas Southwestern Med Center, USA)

Endoscopic cartilage myringoplasty

Philip RAJAN (Hosp. Raja Permaisuri Bainun, Ipoh, Malaysia)

Management recurrent of COM how i do it

Soekirman SOEKIN
(Soekirman Soekin ENT HNS Proklamasi Hosp., Indonesia)

Mastoid obliteration in recurrent COM surgery

Sung Won CHAE (Korea Univ.)

Mastoidoplasty or subtotal petrosectomy: Alternative option for hearing rehabilitation & disease eradication

Shi Nae PARK (The Catholic Univ. of Korea)

RT discussion

Kenneth H. LEE (Univ. of Texas Southwestern Med Center, USA),
Philip RAJAN (Hosp. Raja Permaisuri Bainun, Ipoh, Malaysia),
Soekirman SOEKIN (Soekirman Soekin ENT HNS Proklamasi Hosp., Indonesia), Sung Won CHAE (Korea Univ.), Shi Nae PARK (The Catholic Univ. of Korea), Seung Hwan LEE (Hanyang Univ.),
Jun Ho LEE (Seoul National Univ.)

[OTSP V] BPPV: from Basic to Evidence-Based Clinical Approach

13:30-15:00

RM 4-1 (Convention A)

Chair : Eui Kyung GOH (Pusan National Univ.),
Gyu-Cheol HAN (Gachon Univ.)

Animal study for the pathological mechanism of BPPV

Mamoru SUZUKI (Tokyo Medical Univ., Japan)

Evidence for the diagnosis of benign paroxysmal positional vertigo

Min-Beom KIM (Sungkyunkwan Univ.)

Evidence for the efficacy of reposition maneuvers for posterior canal BPPV

Eun-Ju JEON (The Catholic Univ. of Korea)

Evidence for the efficacy of reposition maneuvers for horizontal canal BPPV

Sung Huhn KIM (Yonsei Univ.)

Natural course of BPPV

Jae Yun JUNG (Dankook Univ.)

[OTSP VI] The Inner Ear Imaging:from Animal to Human Application

15:20-16:50

RM 4-1 (Convention A)

Chair : Won-Ho CHUNG (Sungkyunkwan Univ.),
Hyung Jong KIM (Hallym Univ.)

Imaging and classification of endolymphatic hydrops

Tadao YOSHIDA (Nagoya Univ., Japan)

Role of inner ear MR imaging in Meniere's disease

Won-Ho CHUNG (Sungkyunkwan Univ.)

Inner ear MRI lesson from animal study

Myung-Whan SUH (Seoul National Univ.)

Application of optical coherence tomography in the inner ear imaging

Jeong Hun JANG (Ajou Univ.)

Usefulness of intravital multiphoton microscopy in visualizing study of mouse cochlea and volume changes in the scala media

Young Joon SEO (Yonsei Univ.)

Scientific Program

April 29 (Sun) Rhinology

[RHSP IV] Recent Advances in Obstructive Sleep Apnea

08:50-10:20

RM 4-2 (Convention B)

Chair : Sung Wan KIM (Kyung Hee Univ.),
Sourabha Kumar PATRO

(All India Institute of Medical Sciences (AIIMS), JODHPUR, India)

Phenotyping of OSA

Hyun Jik KIM (Seoul National Univ.)

The usefulness of DISE in the treatment of OSAS

Soo-Kweon KOO (Busan Saint Marys Hosp.)

Gastroesophageal reflux disease and obstructive sleep apnea

Jung-Hwan OH (The Catholic Univ. of Korea)

Office based therapy in OSAS (radio frequency ablation with lifestyle therapy): Impact on quality of life, disease progression and health care costs

Sourabha Kumar PATRO

(All India Institute of Medical Sciences (AIIMS), JODHPUR, India)

[RHKL III] Keynote Lecture

10:40-11:10

RM 4-2 (Convention B)

Chair : Sang Hag LEE (Korea Univ.)

Nasal irrigation and instrumentations in maxillary antrostomies

Revadi GOVINDARAJU (Hosp. Putrajaya, Malaysia)

[RHSP V] What a Precision Medicine Means and It's Application for Rhinologic Field

11:10-12:40

RM 4-2 (Convention B)

Chair : Sang Hag LEE (Korea Univ.),
Xiangdong WANG (Capital Medical Univ., China)

Precision medicine in oncology

Kyong Hwa PARK (Department of Internal Medicine, Korea Univ.)

New genomic era for precision medicine

Yun-Yong PARK

(ASAN Institute for Life Sciences, ASAN Medical Center)

Deep sequencing of the antibody repertoire

Daechan PARK

(Department of Biological Sciences, Ajou Univ.)

Precision medicine in rhinologic field

Xiangdong WANG (Capital Medical Univ., China)

[RHSP VI] Tumor and Skullbase Surgery

13:30-15:00

RM 4-2 (Convention B)

Chair : Joseph HAN (Eastern Virginia Medical School, USA),
Hwan-Jung ROH (Pusan National Univ.)

New technologies in endoscopic skull base surgery

Joseph HAN (Eastern Virginia Medical School, USA)

Challenges in endoscopic skull base surgery draf and trans-cribriform approach

Tae-Bin WON (Seoul National Univ.)

Principles of endoscopic skull base reconstruction

Sang Duk HONG (Sungkyunkwan Univ.)

VR-based training program for endoscopic skull base surgery

Do Hyun KIM (The Catholic Univ. of Korea)

[RHSP VII] New Horizon in Allergic Rhinitis

15:20-16:50

RM 4-2 (Convention B)

Chair : Soo Whan KIM (The Catholic Univ. of Korea),
Heung Man LEE (Korea Univ.)

The role of epithelium in pathophysiology of allergic rhinitis

Ji Heui KIM (Univ. of Ulsan)

Recent update in management of allergic rhinitis

Ji-Hun MO (Dankook Univ.)

Hygiene vs. Microbiome theory in allergic airway diseases

Soo Whan KIM (The Catholic Univ. of Korea)

In-office procedures in allergic rhinitis

Do-Yeon CHO (Univ. of Alabama at Birmingham, USA)

April 29 (Sun) Head & Neck Surgery

[HNSP III] Cutting Edge in HN Research

08:50-10:20

RM 4-3 (Convention C)

Chair : Han-Sin JEONG (Sungkyunkwan Univ.),
John In-taek SONG (Univ. of Colorado, USA)

Dissection of lymph node metastasis and systemic metastasis

Han-Sin JEONG (Sungkyunkwan Univ.)

Development of stem cell based cell therapy for regeneration of parathyroid gland

Han Su KIM (Ewha Womans Univ.)

Use of a novel PET tracer to assess response to anti-PD-1 antibody checkpoint blockade in head and neck squamous cell carcinoma

John B SUNWOO (Stanford Univ., USA)

The role of the oral microbiome in head and neck squamous cell carcinoma

Jason CHAN (The Chinese Univ. of Hong Kong, Hong Kong)

MiRNA in the diagnosis and surveillance of head and neck cancer

John In-taek SONG (Univ. of Colorado, USA)

[HNKL III] Keynote Lecture

10:40-11:10

RM 4-3 (Convention C)

Chair : Young Soo RHO (Hallym Univ.)

Elective neck management in oral cavity cancer

Anil D CRUZ (Tata Memorial Hosp., India)

[HNSP IV] Minimally Invasive HN Surgery

11:10-12:40

RM 4-3 (Convention C)

Chair : Kyung TAE (Hanyang Univ.),
Soe TIN (Victoria Hospital, Yangon, Myanmar)

Minimally invasive organ & functional preservation surgery for T3, T4 oropharyngeal cancer

Se-Heon KIM (Yonsei Univ.)

Radiofrequency ablation of benign thyroid nodules in ORL-HNS Hospital, Yangon, MYANMAR

Maung Maung KHAING (Univ. of Medicine(1) Yangon, Myanmar)

Prevention and management of complications of endoscopic/robotic nasopharyngectomy

Raymond TSANG (Univ. of Hong Kong, Hong Kong)

Future of robotic surgery

Yoon Woo KOH (Yonsei Univ.)

The trans-hairline approach for robotic surgery of head neck

Tsung-Lin YANG (National Taiwan Univ., Taiwan)

[HNSP V] Current Issue of Thyroid Gland

13:30-15:00

RM 4-3 (Convention C)

Chair : Kwang-Yoon JUNG (Korea Univ.),
Iwao SUGITANI (Nippon Medical School, Japan)

Change in incidence of thyroid cancer in Korea and its implications

Yuh-Seog JUNG (National Cancer Center)

Moving surgeons stance to the most common thyroid cancer, T1 papillary carcinoma

Iwao SUGITANI (Nippon Medical School, Japan)

The practical issues in the management of thyroid swellings

Soe TIN (Victoria Hosp., Yangon, Myanmar)

EMG signal loss and RLN injury during monitored thyroidectomy- evaluation and management

Che-Wei WU (Kaohsiung Medical Univ., Taiwan)

Present-day advanced technology and techniques of thyroid operation:Focus on novel IONM

Byung-Joo LEE (Pusan National Univ.)

Diagnostic procedure of neck disease found incidentally in thyroid ultrasound examination

Madoka Kaneko FURUKAWA (Kanagawa Cancer Center, Japan)

[HNSP VI] The Changing Fields of Laryngopharyngeal Reflux: Speculations as to the Future

15:20-16:50

RM 4-3 (Convention C)

Chair : Kumud Kumar HANDA
(Medanta Medicity, Gurgaon, India),
Sung Min JIN (Sungkyunkwan Univ.)

Do laryngopharyngeal findings reflect the characteristics of reflux

Kumud Kumar HANDA (Medanta Medicity, Gurgaon, India)

Diagnosis of LPRD utilizing -hour multichannel intraluminal impedance (MII) pH monitoring

Young-Gyu EUN (Kyung Hee Univ.)

Implementing pH-Impedance testing before prescribing PPIs in suspected LPR minimizes overall treatment costs

Thomas L CARROLL (Harvard Medical School, USA)

Pepsin revisited:Effects of pepsin on normal laryngeal epithelial cells

Sang-Hyuk LEE (Sungkyunkwan Univ.)

Novel therapeutic for reflux disease which specifically targets pepsin

Nikki JOHNSTON (Medical College of Wisconsin, USA)

Scientific Program

April 29 (Sun) ORLSP

[ORL-간행위원회 워크숍]	
10:40~12:10 *Korean Session	RM 2-6 (Peacock) Chair: 박경호 (간행이사)
10:40-10:45	인사말 이재서 교수 (대한이비인후과학회 이사장)
10:45-11:15	Strategy and tips for writing a research paper 김순 (에디터지)
11:15-11:35	구글링을 통한 의학논문 연구자료 검색 강주완 (제주대)
11:35-11:55	빅데이터를 이용한 논문 작성법 최효근 (한림의대)
11:55-12:10	한이인지 투고체계, 편집방침, 온라인투고 및 심사시스템 황세환 (가톨릭의대)

[ORL-연구 활성화 심포지움] Research Trends in ORL-HNS	
13:30~15:30 *Korean Session	RM 3-3 (Diamond) Chair: 채성원 (고려의대)
딥러닝을 이용한 인공지능 연구의 활용 김남범 (가천의대 길병원 뇌과학연구소)	
3D-bioprinting 연구의 실제 강현욱 (울산과학기술원)	
NGS 기반의 맞춤치료 김열홍 (고대의대 중앙내과)	
이비인후과외과학의 국가연구비 접근법 이규엽 (경북의대 이비인후과)	

Sponsored symposium

April 28 (Sat)

Sponsor Symposium - Oticon	
11:30~12:30	RM 2-1 (Flamingo) Moderator: Jong Woo Chung
1. The first true Oticon Medical CI system Claus Frees Horneman	
2. Experience with Neuro System Min Beom Kim	
3. Cochlear Implant treatment in patients with single sided deafness Jaime Marco	
4. The Neuro CI system with Neuro2 – First review of clinical evidence Michel Hoen	

Luncheon Symposium - Cochlear	
12:30~13:30	RM 4-1 (Convention A) Chair: YongJae HWANG (General Manager)
Cochlear nucleus profile with slim modiolar electrode (CI532) David CADE (Chief Medical Officer)	

Luncheon Symposium - Ahngook Pharm	
12:30~13:30	RM 4-2 (Convention B) Chair: Kyung-Su KIM (Yonsei Univ.)
Rupatadine: Novel antihistamine for the treatment of allergic disease Tae-Bin WON (Seoul National Univ.)	

April 29(Sun)

Luncheon Symposium - Boryung Pharm	
12:40~13:30	RM 4-2 (Convention B)
Sublingual immunotherapy for allergic rhinitis- actair tablet Hyun Jong LEE (Lee&Hong ENT Sleep & Cosmetic Center)	

런천 특강_유한양행	
12:40~13:30	RM 3-1, 2 (Emerald A, B)
Allergic rhinitis practice pattern vs. guideline 홍상덕 (성균관대의대)	

의사회 프로그램

April 29 (Sun)

[CL] 임상특강 I

08:50~09:20

RM 3-1, 2 (Emerald A, B)

좌장: 최재진 (강동연세이비인후과)

이비인후과 입장에서 천식 환자의 진료를 통해 얻을 수 있는 것점 - 환자
자와 의사가 원하는 전략

신현수 (코모케이비인후과)

[CL] 개회식

09:20~9:40

[CL] 임상특강 II

09:40~10:10

RM 3-1, 2 (Emerald A, B)

좌장: 김형태 (예송이비인후과)

이비인후과 의원에서 꼭 준비하고 알아야 할 감염관리노하우 - 감염 전
문가에게 배운다

최영화 (아주의대 감염내과)

[CL] 전체 특강

10:10~10:40

RM 3-1, 2 (Emerald A, B)

좌장: 한창준 (나래이비인후과)

성인 급성 상기도 호흡기 감염 항생제 지침을 이비인후과에 적용해보
다 - 올바른 진료가 최선의 치료

김신우 (경북의대 알레르기감염내과)

[CL] 임상특강 III

11:00~11:30

RM 3-1, 2 (Emerald A, B)

좌장: 김익태 (메디서울이비인후과)

2020년 도래될 노인이비인후과를 준비하며

윤종률 (한림의대 가정의학과)

[CL] 교양특강 I

11:30~12:00

RM 3-1, 2 (Emerald A, B)

좌장: 홍성수 (연세이비인후과)

잘 먹고 잘 사는 것의 문제와 각종 요리 방송과의 상관관계

홍신애 (수요미식회 요리연구가)

[CL] 정책특강

12:00~12:40

RM 3-1, 2 (Emerald A, B)

좌장: 최종욱 (관악이비인후과)

보험정책: '건강보험정책의 현재와 중장기 계획'

손영래 (보건복지부 예비급여과장)

[CL] 런칭특강 - 유한양행

12:40~13:30

RM 3-1, 2 (Emerald A, B)

Allergic Rhinitis Practice pattern vs. guideline

홍상덕 (성균관의대)

[CL] 임상특강 IV - 개원가에서 응용 가능한 비과 관련 수술법을 공유 합니다

13:30~14:30

RM 3-1 (Emerald A)

좌장: 유동희 (새롬이비인후과)

1. 교정이 어려운 비중격도 이것만 알면 교정할 수 있다(비중격교정술)

김효열 (성균관대의대)

2. 늦기 전에 배워 두자 (법정비급여 수술의 마지막 보루, 비밸브성형술)

이건희 (경희의대)

[CL] 임상특강 VI - 응급실에 가기 보다는 이비인후과 외래에서 치료 하라

14:30~15:30

RM 3-1 (Emerald A)

좌장: 김규식 (코앤코이비인후과)

1. 급성호흡기질환에서 네뮬라이저를 사용하고 약물을 추천하는 요령
총정리

권혁술 (서울의대 응급의학과)

2. 비출혈 패킹 - 코피 지혈목적 패킹의 종류와 상황에 맞는 패킹 재료
의 선택, 패킹 후 시간에 따른 임상경과

조규섭 (부산의대)

3. 안면 외상 - 응급실에 가지 않고도 이비인후과 외래에서 처치가 가능한
외상 처치 및 수술법 - 안면 외상은 이비인후과에서

진홍률 (덕터진이비인후과)

[CL] 심포지움 II - 급여화 될 수동/자동 양압기 관련 지식 공유하기

15:50~17:00

RM 3-1 (Emerald A)

좌장: 박창식 (한사랑그린이비인후과)

1. 1) 양압기 급여화제도 이해하기

2) 양압기는 어떤 기능(종류)이 있고, 렌탈 제도는 어떻게 시행될 예
정인가

이현중 (리앤홍이비인후과)

2. 3) 양압기를 처방하고 관리해보자

4) 양압기를 처방하고 장기적으로 follow up 하는 요령 및 데이터 분
석, 경과도중 발생하는 문제 해결하기

홍일희 (서울수면의원)

의사회 프로그램

April 29 (Sun)

[CL] 임상특강 V - 내분비내과 교수님들께 듣는 '실전 갑상선 진료'
13:30~14:30 RM 3-2 (Emerald B)
좌장: 주형로(하나이비인후과병원)

1. 갑상선 혈액 검사의 해석 - 언제, 어떻게, 어떤 약을 써야할까?
조선욱 (서울의대 내분비내과)
2. 갑상선 결절 - 초음파에서 발견된 결절을 외래에서 대처하고 관리하기
안지현 (고려의대 내분비내과)

[CL] 심포지움 I - 이석증 패널토의
“횡수방”에 올려서 물어보고 싶은 어려운 증례를 머리맞대고 해결해보자
14:30~15:30 RM 3-2 (Emerald B)
좌장: 황찬호 (양천서울이비인후과)

패널리스트
박상호 (신사호이비인후과), 서명환 (서울의대), 심대보 (명지병원), 유재철 (위례
센트럴이비인후과), 임구일 (연세미래이비인후과), 홍석민 (한림의대)

**[CL] 심포지움 III - 동영상으로 배우보는 구강 내 질환의 표준치료(진
료를 업그레이드하라!!)**
15:50~17:00 RM 3-2 (Emerald B)
좌장: 박선태 (코모케이비인후과)

1. 침샘 질환의 현실적 접근: 감별진단, 개원가에서 가능한 검사, 약
물 소개
김희진 (한림의대)
2. 구강 내 양성 & 전암성 병변을 감별하고 조직 검사할 때 유의사항
정우진 (서울의대)
3. 두경부 전문의가 아니어도 외래에서 쉽게 따라할 수 있는 구강 수술
테크닉 - 동영상을 중심으로 법
문정환 (단국의대)

Instruction Course

April 28 (Sat)

[IC 1] 10:30-11:10 RM 2-1 (Flamingo)
Basics of tissue engineering: What is stem cell, growth
factor and scaffold? How do we prepare them?
Seong Keun KWON (Seoul National Univ.)

[IC 2] 10:30-11:10 RM 2-2 (Skylark)
Stapes surgery
Ho-Ki LEE (Soree Ear Clinic)

[IC 3] 10:30-11:10 RM 2-3 (White Heron)
Surgical tips for the management of the wide nasal base
Ji Yun CHOI (Chosun Univ.)

[IC 4] 11:30-12:10 RM 2-2 (Skylark)
Tips and tricks in laryngeal framework surgery
Kumud Kumar HANDA
(Chairman Dept. of ENT & Head Neck Surgery, India)

[IC 5] 11:30-12:10 RM 2-3 (White Heron)
Restoring the functionally devastated nasal airway after
septorhinoplasty
Hong Ryul JIN, Jong Sook YI (Dr Jins Premium Nose Clinic)

[IC 6] 11:30-12:10 RM 2-4 (Swan)
Surgical treatment of recurrent nasopharyngeal carcinoma
Jimmy Yu-wai CHAN (The Univ. of Hong Kong, Hong Kong)

[IC 7] 13:30-14:10 RM 2-4 (Swan)
Personal tips in basic and advanced techniques of
septoplasty
Yong Ju JANG (Univ. of Ulsan)

Video Lecture

April 29 (Sun)

[IC 8]	08:30-09:10 RM 2-5 (Crane)
Subtle glottic insufficiency and diagnostic vocal fold augmentation <i>Thomas L. CARROLL (Brigham and Women's Hosp. USA)</i>	
[IC 9]	09:30-10:10 RM 2-5 (Crane)
BAHA:The importance of using super power instruments in BAHS patients <i>Jaime MARCO (Univ. of Valencia, Spain)</i>	
[IC 10]	10:40-11:20 RM 2-5 (Crane)
Basic principles of laryngo-microsurgery <i>Han Su KIM (Ewha Womans Univ.)</i>	
[IC 11]	11:40-12:20 RM 2-5 (Crane)
Dysphagia in head and neck cancer therapy <i>Young Hak PARK (The Catholic Univ. of Korea)</i>	
[IC 12]	13:30-14:10 RM 2-5 (Crane)
Surgical technique for cochlear implantation from basic to advanced <i>Jun Ho LEE (Seoul National Univ.)</i>	
[IC 13]	14:20-14:50 RM 2-5 (Crane)
Retrosigmoid approach for acoustic tumor removal surgical landmarks and tips <i>Ki-Hong CHANG, Beom-Cho JUN (The Catholic Univ. of Korea)</i>	
[IC 14]	15:20-16:00 RM 2-5 (Crane)
Easy and safe fiberoptic laryngeal laser surgery (FLS) under local anesthesia <i>SeungWon LEE (Soonchunhyang Univ.)</i>	
[IC 15]	16:10-16:40 RM 2-5 (Crane)
Beginning and setting up transoral endoscopic thyroid surgery from A to Z <i>Jun-Ook PARK (Inje Univ.)</i>	

April 28 (Sat)

TIME	TITLE	PRESENTER
	Endoscopic tympanoplasty	Sung il NAM (Keimyung Univ.)
	In-office cryosurgery in the nasal passage for patients with chronic rhinitis	Do-Yeon CHO (Univ. of Alabama at Birmingham, USA)
	Limited palatal muscle resection:A novel palatopharyngoplasty technique for OSA	Kyu-Sup CHO (Pusan National Univ.)
	Endoscopic transseptal approach - A case of meningioma	Sung Won KIM (The Catholic Univ. of Korea)
	Costal cartilage rhinoplasty	Ji YUN CHOI (Chosun Univ.)
	Immediate nasal reconstruction after infected gore-tex implant removal	Hong Ryul JIN, Jong Sook YI (Dr. Jins Premium Nose Clinic)
	Basic open rhinoplasty (from incision to closure)	Kun Hee LEE (Kyung Hee Univ.)
10:30-12:40	Bilateral modified nasoseptal "rescue" flaps in the endoscopic endonasal transsphenoidal approach	Sung Won KIM (The Catholic Univ. of Korea)
	Ultrasound diagnosis for cervical lymph node metastasis of head and neck squamous cell carcinoma	Madoka Kaneko FURUKAWA (Kanagawa Cancer Center, Japan)
	Trans-oral robotic thyroidectomy preclinical simulation in cadavers	So-Yoon LEE (CHA Univ.)
	How to harvest fasciocutaneous free flap from anterolateral thigh area	Won Shik KIM (Seoul National Univ.)
	TORS radical tonsillectomy, base of tongue resection and retropharyngeal lymph node dissection with the da vinci SP robot	Raymond TSANG (Univ. of Hong Kong, Hong Kong)
	Vascular bypass and craniofacial resection for locally advanced nasopharyngeal carcinoma	Jimmy Yu-wai CHAN (Univ. of Hong Kong, Hong Kong)
12:40-13:30	Lunch	
13:30-15:30	Repeat	

Plenary Session

April 28 (Sat)

[Plenary Session]

09:20-10:00

RM 4-2 (Convention B)

4천만명 행태/기호 Big Data를 우리는 어떻게 활용할 것인가?



구교식 (와이더 플래닛 대표)

Hands-on Course

April 27 (Fri)

[RHHO] Practical Reading of PSG and PAP Application for OSA Patients

15:00-17:00

RM 2-2 (Skylark) Hotel 2F

Practical reading of PSG: Facilitator will give a brief presentation to participants on the sleep staging rules according to AASM Guidelines as well as the tips and tricks in sleep staging. There will be a practical session whereby participants will stage-score an actual patient data and then review the scoring sleep stages and events.

[HNHO] Endoscopic & Robotic Head and Neck Surgery Dissection Course

07:00-19:00 The Severance Hosp. Cancer Center, Yonsei Univ.

This course will cover all aspects of current minimally invasive robotic/endoscopic head and neck surgery, providing an opportunity to demonstrate and experience the advanced surgical techniques. The course will consist of detailed lectures, demonstrations and dissections on frozen corpses.

April 29 (Sun)

[ULHO] Head & Neck Ultrasound Intensive Course

09:00-12:50

RM 3-3 (Diamond) Convention 3F

This course is going to cover the head and neck ultrasound anatomy. We can review what we need to check during the ultrasound scanning and ultrasound-guided procedure. Live-demonstration of experienced doctors and intensive hands-on session will be provided.

■ 기타 안내

2018년 신입전공의 오리엔테이션 및 수련병원 과장회의

- 일시 : 2018년 5월 11일(금)~12일(토)
- 장소 : 천안 상록리조트

전공의 자율평가고사

- 일시 : 2018년 9월 1일(토)
- 장소 : 전국 지정 고사장

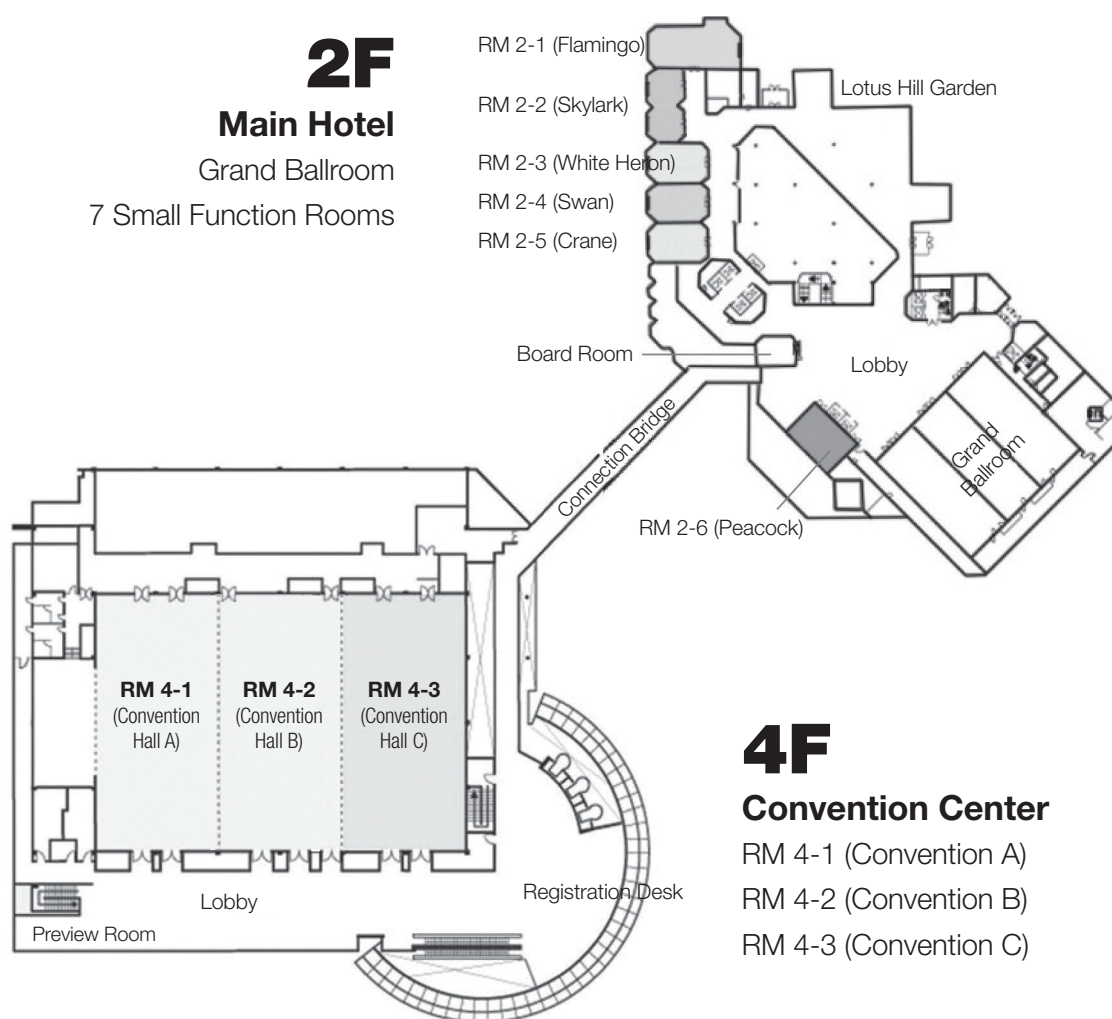
The 10th Korean-American Satellite Symposium (KASS)

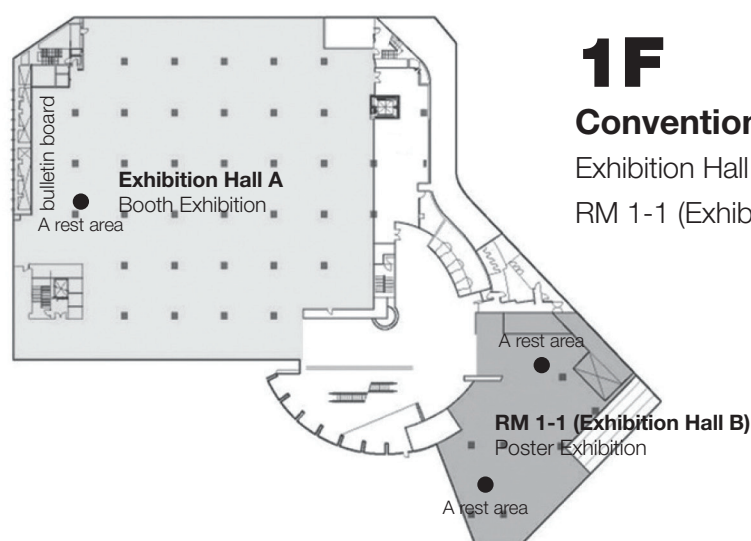
- 일시 : 2018년 10월 7일(일)
- 장소 : Atlanta, USA

제24차 이비인후과 종합학술대회

- 일시 : 2018년 10월 12일(금)~13일(토)
- 장소 : 제주컨벤션센터(ICC)

■ Floor Plan





1F

Convention Center

Exhibition Hall A

RM 1-1 (Exhibition Hall B)

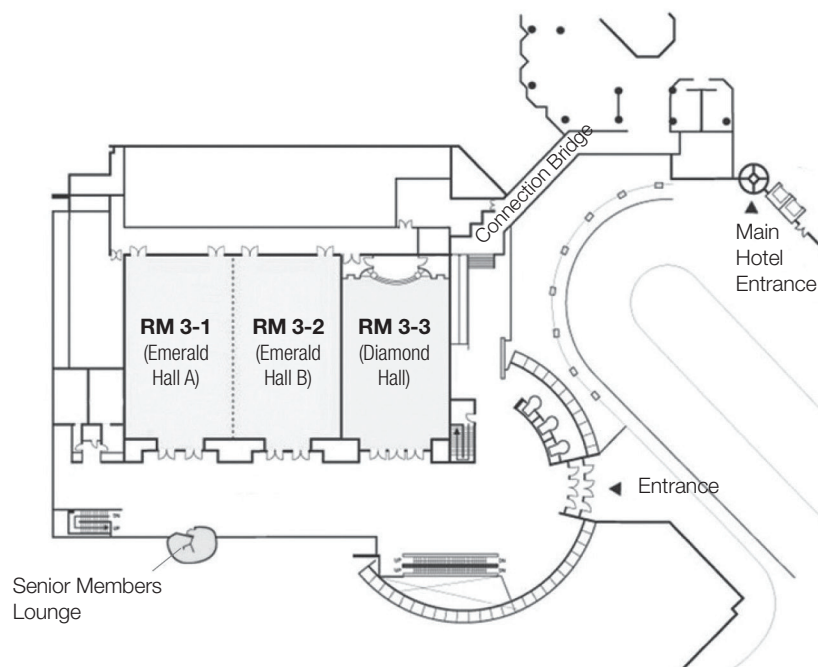
3F

Convention Center

RM 3-1 (Emerald A)

RM 3-2 (Emerald B)

RM 3-3 (Diamond)



Program at a Glance

April 27(Fri)

Floor	Convention 3F		Hotel 2F	
Room	RM 3-3 (Diamond)	RM 3-1 (Emerald A)	RM 2-1 (Flamingo)	RM 2-2 (Skylark)
7:00				
10:00				
10:30				
11:00				
11:30				
12:00				
12:30				
13:00				
13:30				
14:00				
14:30			Current Trends of Head and Neck Ultrasound in Japan, Taiwan and Korea (대한갑상선두경부외과학회 초음파위원회)	
15:00				
15:30			Free flap vs local flap reconstruction in patients with multiple comorbidities (두경부재건 연구회)	RHHO (Practical reading of PSG and PAP application for OSA patients)
16:00		ORL 지도전문의 교육 (수련부) Korean		
16:30				
17:00				
17:30			Korean nasal polyp Consensus Meeting (부비동연구회)	
18:00				
20:00	Welcome Reception			

April 28(Sat)

Floor	Convention 4F			Convention 3F		
Room	RM 4-1 (Convention A)	RM 4-2 (Convention B)	RM 4-3 (Convention C)	RM 3-1 (Emerald A)	RM 3-2 (Emerald B)	RM 3-3 (Diamond)
7:00						
7:30						
8:00						
8:30	OTOP 1 (Facial Nerve)		HNOP 1 (Cancer research)	OTOP 2 (External Ear & Others)	RHOP 1 (Rhinosinusitis I)	HNOP 2 (Salivary gland)
9:00						
9:30		Opening Ceremony Plenary Session				
10:00		Congress Photo				
10:30	Coffee Break					
11:00	OT-KL 1 (Current Diagnosis and Management of Congenital CMV Related Hearing Loss)	RH-KL 1 (Physician Wellness)	HN-KL 1 (Influences of tumor heterogeneity in head and neck cancer on immune response)	Resident Paper Award		
			HN-KL 2 (Elective neck management in Oral cavity cancer)	OTOP 3 (Basic I)	RHOP 2 (Rhinoplasty)	HNOP 3 (Laryngology I)
11:30	OT-SP 1 (Where are otologists now in the genomics-based precision-medicine era?)	RH-SP 1 (Immunity and pathogenesis of CRS/NP)	HN-SP 1 (Tracheoesophagology)	OTOP 4 (Tinnitus)	RHOP 3 (Tumors)	Resident Paper Award
12:00						HNOP 4 (Laryngology II)
12:30						
13:00	Luncheon Symposium (Cochlear Symposium)	Luncheon Symposium (AHNGOOK PHARM Symposium)	Luncheon			
13:30						
14:00	OT-KL 2 (The genetic background of the patients with cochlear implantation)	RH-KL 2 (Immunotherapy up-to-date for allergic rhinitis)		ORLSP- Audiologist (Practical instructions and strategies for emerging audiolocal assessment)	ORLSP-Nurse 1 Korean	ORLSP-SLP (Specialty Care for Voice Disorders: special know-how from high-end voice center)
14:30	OT-SP 2 (Expansion of the indication of cochlear implantation: Recent updates)	RH-SP 2 (Challenges in Frontal Sinus Surgery)	HN-PD 1 (Salvage treatment of recurrent oral cavity cancer)	Korean		Korean
15:00						
15:30	Coffee Break					
16:00				OT-SP 3 (State-of-the-art surgical techniques in otologic surgery)	RH-SP 3 (Tips and Pearls of Augmentation Rhinoplasty)	HN-SP 2 (Reconstruction in Head and Neck)
16:30						
17:00						
17:30						
18:00						
20:00	Congress Banquet					

Floor	Hotel 2F			Severance Robot & MIS center, Yonsei University Sevrans Hospital, Seoul	Chung-ang Univ. Hospital
Room	RM 2-3 (White Heron)	RM 2-4 (Swan)	RM 2-5 (Crane)		
7:00					
10:00					
10:30					
11:00					
11:30					
12:00					
12:30					
13:00					
13:30					
14:00					
14:30					
15:00					
15:30			Intraoperative Neuromonitoring (대한갑상선두경부외과학회)		
16:00		Study Groups - Sleep & Physiology of Korean Rhinologic Society (수면연구분과)			
16:30	Cochlear Implant Committee (대한청각학회)				
17:00		Multicenter Study Suggestions for Facial Palsy (안면신경연구회)	Tinnitus update: state-of-the-art (이과 대한이과학회 이명연구회)		
17:30					
18:00					
20:00					

Floor	Hotel 2F						Convention 1F					
Room	RM 2-1 (Flamingo)	RM 2-2 (Skylark)	RM 2-3 (White Heron)	RM 2-5 (Crane)	RM 2-4 (Swan)	RM 2-6 (Peacock)	RM 1-1 (Exh. B)					
7:00				Video Lecture			Poster Exhibition					
7:30												
8:00												
8:30												
9:00												
9:30												
10:00				Coffee Break								
10:30				IC 1 (Basics of Tissue Engineering : What is stem cell, growth factor and scaffold? How do we prepare them?)				IC 2 (Stapes surgery)	IC 3 (Personal tips in basic and advanced techniques of septoplasty)	VL	MOU KORL-HNS & The ASEAN ORL-HNS Federation MOU Signing Ceremony	Exhibition Ribbon Cutting
11:00												OTPP RHPP HNPP
11:30												
12:00				Sponsor Symposium (Oticon Medical Symposium)				IC4 (Tips and tricks in laryngeal framework surgery)	IC 5 (Restoring the functionally devastated nasal airway after septorhinoplasty)	IC 6 (Surgical treatment of recurrent nasopharyngeal carcinoma)		
12:30												
13:00												
13:30												
14:00				OTOP 5 (Otitis Media & Cholesteatoma I)				RHOP 4 (Rhinosinusitis (Basic) I)	HNOP 5 (Cancer research II)	VL	IC 7 (Surgical Tips for the Management of the Wide Nasal Base)	
14:30												
15:00				OTOP 6 (Inner Ear I)				RHOP 5 (Sleep Related Breathing Disorders I)	HNOP 6 (Thyroid I)			
15:30				Coffee Break								
16:00	CEO journal's 10 th anniversary ceremony	ORLOP-Audiologist	ORLOP-SLP	ORLOP (Extended OP)	ORLSP-Nurse 2		Poster Presentation - OTPP - RHPP - HNPP					
16:30		Korean	Korean		Korean							
17:00			RHOP 6 (Best oral Presentation)	HNOP 7 (Best oral Presentation)				OTOP 7 (Best oral Presentation)				
17:30												
18:00												
20:00												

OTKL I

RM 4-1 (Convention A)
Chair : Seung Ha OH

Keynote Lecture

» 10:30~11:00

» Current diagnosis and management of congenital CMV related hearing loss

University of Texas Southwestern Medical Center, USA

Kenneth H. LEE

World wide, Cytomegalovirus (CMV) is the most common cause of congenital infection. The impact of this virus is significant in otolaryngology as CMV is the leading cause of congenital sensorineural hearing loss that is not of genetic etiology. Nevertheless, congenital CMV often goes undiagnosed, as children born with this infection are often asymptomatic at birth. In addition, universal screening protocols have not been developed. With early detection, recent studies have shown that treatment with antiviral therapy can prevent or minimize the hearing loss that can result from congenital CMV infection. This presentation will review the public health impact of CMV. In addition, the current methods of diagnosis and strategies to avoid the pitfalls of misdiagnosis will be discussed. Universal screening for congenital CMV would be a burdensome financial endeavor, but the expense of missing the opportunity to prevent hearing loss in children may be a greater cost overall. The pros and cons of universal versus hearing targeted CMV screening will be presented. Lastly, the options of treatment with antiviral therapy for congenital CMV will be reviewed to provide a guideline for management.

OTKL II

RM 4-1 (Convention A)
Chair : Yong Bum CHO

Keynote Lecture

» 13:30~14:00

» The genetic background of the patients with cochlear implantation

Shinshu University School of Medicine, Japan

Shin-ichi USAMI

Background: Genetic factors, the most common etiology in severe to profound hearing loss, are one of the key determinants of cochlear implantation (CI) outcomes. Satisfactory auditory performance after receiving cochlear implantation (CI) (including Electric Acoustic Stimulation: EAS) in patients with particular gene mutations indicates that genetic testing would be helpful in deciding treatment choices. Whether the etiology is located within the cochlea or not would be an important information for prediction of outcomes after CI. For EAS, selection criteria and decision making is sometimes difficult because of individual differences in residual hearing and progression. There are considerable numbers of children who have residual hearing, therefore evaluating residual hearing and estimating progression is important. However, for very young children, it is difficult to evaluate residual hearing in the low frequencies. One advantage of genetic testing is that the possible prognosis for hearing, i.e., progressive or not, can be predicted for individual patients.

Methods: The genetic background of pre-lingual as well as post-lingual deafness patients with CI or EAS was evaluated. Furthermore, auditory performance after cochlear implantation was reviewed in the patients who underwent genetic evaluation.

Results: Our genetic analysis series identified mutations in several genes, including GJB2, SLC26A4, MYO15A,

TECTA, CDH23, TMPRSS3, ACTG1, TMC1 and the mitochondrial 1555A>G, 3243A>G mutation. This suggests that at the least, these genes may be involved in the CI and EAS patients. Since patients with these mutations showed relatively good auditory performance with CI or EAS, genetic background could be added as one of the factors to predict the performance after the implantation. The patients with CDH23 mutations have residual hearing in the lower frequencies, suggesting they are good candidates for EAS. Successful hearing preservation as well as good outcomes from EAS in patients with CDH23 mutations was confirmed. Successful hearing preservation and prediction of future hearing level by genetic diagnosis may facilitate decision making for early intervention. Conclusion: Genetic testing is potentially useful for evaluating residual hearing and estimating progression, and important for patient selection for CI or EAS.

Reference: Miyagawa M, Nishio S, Usami S. A Comprehensive Study on the Etiology of Patients Receiving Cochlear Implantation With Special Emphasis on Genetic Epidemiology. Otol Neurotol 37: e126-134 2016.

OTSP I

RM 4-1 (Convention A)

Chair : See Ok SHIN, Takehiko UYEYAMA

**Where are otologists now in the
genomics-based precision-medicine era?**

» **11:00~11:20**

» What does newborn genetic screening for hearing impairment provide to otologists a mine of future information or pandoras box

*Department of Otolaryngology, National Taiwan
University Hospital, Taipei, Taiwan*

Chen-Chi WU

For children with sensorineural hearing impairment (SNHI), early identification and management are of great benefit through improved language, communication, and mental development. For this purpose, the feasibility and cost-effectiveness of universal newborn hearing screening (UNHS) have been supported by many studies. However, infants with mild, progressive, or late-onset SNHI might be missed by conventional UNHS. It has been documented that >50% and ~10% of children with SNHI are caused by genetic factors and congenital cytomegalovirus (cCMV) infections, respectively; and certain genetic mutations or cCMV infections might lead to mild, progressive, or late-onset SNHI. In our recent studies, we incorporated newborn genetic and CMV screenings into the UNHS protocol to investigate the feasibility and potential benefits of this comprehensive screening strategy. Our results confirmed the feasibility of performing hearing, genetic, and CMV screenings concurrently in newborns, and provided evidence that the incorporation of these screening tests could potentially identify an additional subgroup of infants with impaired hearing that might not be detected by the UNHS programs. Despite the feasibility and potential benefits, the integration of genetic and CMV screenings into the current UNHS programs might pose a

psychological burden on parents and have socioeconomic impact on the health care system. Our experience with regards to the newborn screenings will be presented.

» 11:20~11:40

» Hearing loss causing from impaired actin dynamics clinical implications

Lab. of Molecular Pharmacology, Biosignal Research

Ctr., Kobe Univ.

Takehiko UHEYAMA

In the past two decades, extensive research on the genetics of nonsyndromic hereditary deafness (NSHD) has been conducted, leading to the discovery of about 100 genes essential for hearing; about 30 of these encode proteins that interact directly or indirectly with actin. Actin turnover and rearrangement (i.e. actin dynamics) alter overall cell geometry and polarity as well as local membrane topology to form distinct cellular structures, such as filopodia, lamellipodia and cell-cell junctions. Stereocilia and apical junctional complexes (AJs) are actin-based key structures for functions as well as development and maintenance in inner ear hair cells (HCs), and they have a relatively slow turnover. Currently, we are intensively studying about Rho-family small GTPases including Cdc42, Rac, RhoA, RhoF, which are key regulators for dynamic actin structures/organizations. During the study of Cdc42 using inner ear HC-specific knockout (KO)-mice, we found that the activated RhoA signaling as one of causes of progressive hearing loss observed in Cdc42-KO (Atoh1-Cre;Cdc42^{flox/flox}) mice. RhoA is an upstream regulator of DIA1/DIAPH1, which is a key molecule in straight/unbranched actin elongation and responsible gene of autosomal dominant nonsyndromic sensorineural hearing loss (DFNA1). We have clarified that DFNA1 is caused from the constitutively active mutant of DIA1, in which the autoinhibitory intramolecular interaction between the N-terminal diaphanous inhibitory domain (DID) and the C-terminal diaphanous autoregulatory domain (DAD) is

disrupted. In this symposium, I will present recent advances of our studies, and talk about the pathological mechanisms and clinical features of DIA1-associated hearing loss causing from impaired (accelerated or reduced) actin dynamics.

» 11:40~11:55

» Is a gene-therapy-era for hearing loss just around the corner?:Expectations and limitations

Department of Otorhinolaryngology-Head and Neck

Surgery, School of Medicine, Kyungpook National

University

Kyu-Yup LEE

Hearing loss is a highly prevalent sensory defect in humans. In greater than 50% of patients, hearing loss is caused by genetic factors. Nevertheless, there is no fundamental therapy to treat this disease. Gene therapy is a novel and promising approach to clinically restore hearing function and replace defective cells, and it represents the best hope for the reversal of hearing loss. However, few results related to gene therapy for hearing loss have been published, and there are many questions that remain regarding the applicability of this approach for different types of hearing loss and its feasibility in humans. Recently, we achieved gene delivery by introducing a recombinant adeno-associated virus (rAAV) expressing a gene causing hearing loss directly into the otocyst at embryonic day (E) 12.5 using a trans-uterine approach. And we demonstrated functional and morphological rescue of the hair cells of the inner ear in a mouse model of genetic sensorineural hearing loss using an in utero, virus-mediated gene therapy approach. However, there are serious ethical concerns since local gene delivery amounts to an invasive procedure for non-lethal disease. To overcome these concerns, it will be necessary to develop a non-invasive method that induces sufficient function to ensure the development of robust inner ear function.

» 11:55~12:10

» Does genetic diagnosis substantially influence clinical practice in cochlear implantation? How and when?

*Dept. of Otorhinolaryngology, Seoul National
University Bundang Hospital*
Byung Yoon CHOI

Clarification of the molecular etiology enables understanding of the pathophysiology of deafness and sometimes provides clues to efficient auditory rehabilitation. Here we provide how we can apply understanding of the molecular etiology and genetic information to hearing rehabilitation. Auditory rehabilitation comprises conventional hearing aid, middle ear implant, bone conduction implantable hearing aid, and cochlear implantation based on the degree of sensorineural hearing loss. Appropriate selection of the rehabilitation method is, of course, mandatory for successful outcomes. Clarification of genetic etiology can contribute to decision of candidacy of each modality. Single side deafness has been spotlighted as an important emerging indication of bone conduction implantable hearing aid. Normal, stable contralateral hearing is mandatory for this indication. Molecular diagnosis of Waardenburg syndrome by detection of autosomal dominant MITF or PAX3 mutations has been associated with this characteristic. Lastly, the molecular genetic diagnosis plays a significant role in selection of the best candidate and decision of timing of cochlear implantation for auditory neuropathy spectrum disorders (ANSD). Some ANSD can improve over time, while other ANSD should be rehabilitated as early as possible. Genetic diagnosis of DFNB9 as detected by autosomal recessive OTOF mutations can facilitate this decision process, contributing to early rehabilitation. Recently our group has refined the bioinformatic filtering process of variants of these ANSD subjects in Koreans. This refinement of filtering process of NGS data has significantly improved the yield of molecular diagnosis for ANSD subjects. Now, the

unprecedented era of the customized auditory rehabilitation based on genomics is just around the corner.

» 12:10~12:25

» Can we attenuate progressive hearing loss by knowing its genetic etiology

*Department of Otorhinolaryngology, Yonsei University
College of Medicine*
Jinsei JUNG

Hearing loss is the most common disease of sensory impairment with extremely variable etiologies. Approximately two-thirds of congenital hearing loss is caused by genetic etiology. Recently, with the help of next generation sequencing technology, numerous deafness-related genes have been discovered over the past 10 years, which makes clinical geneticists enable precise genetic counseling. Moreover, identification of the etiology of a hearing loss may improve prognostic accuracy. Regarding noise-induced hearing loss or age-related hearing loss, identified genetic etiologies enable patients to prevent the progression of hearing loss with life modification. Although treatment for genetic hearing loss mostly depends on hearing aids or implantable devices yet, drug-based treatment is also promising in cases of some genetic etiologies. In this presentation, it will be discussed how progressive hearing loss could be attenuated and prevented by the identification of genetic backgrounds.

OTSP II

RM 4-1 (Convention A)

Chair : Barrie Yau Boon TAN, Sung Hwa HONG

**Expansion of The Indication of Cochlear
Implantation: Recent Updates**

» **14:00~14:20**

» Venturing into the new and expanded frontiers
- cochlear implantation in single sided deafness
arising from sudden sensorineural hearing loss - A
novel form of treatment

*Head Of Department, Department Of Otolaryngology,
Singapore General Hospital*
Barrie Yau Boon TAN

Background: Cochlear implantations have been traditionally performed in patients with bilateral severe to profound sensorineural hearing loss. Recently there has been a move to performing cochlear implants in patients with asymmetrical hearing loss or single sided deafness. Early reports suggest benefits with sound localization, tinnitus control as well as hearing in noisy environments. However these studies have mostly been done in Western countries and few have been reported in Asian countries. Also none of the studies have only focused on the single sided deafness due to sudden sensorineural hearing loss.

Study design and Methodology: This was a prospective cohort study. Eligibility criteria included the following: Adults aged 18-75 years of age. Hearing in the better hearing ear would have to be in the normal-mild hearing loss range (0-40dBHL). Hearing in the poorer hearing ear has to be in the severe to profound range (70-110dBHL). The etiology of the hearing loss has to be due to idiopathic sudden sensorineural hearing loss. The duration of the deafness in the poor hearing ear has to be between 6 months to 5 years duration. Outcome measurements are performed before the surgery and 1 year after the surgery. Tinnitus outcome measures include the Visual Analogue

Score (VAS) and the Tinnitus Handicap Inventory (THI) questionnaire. Hearing performance evaluation was performed using hearing or Implant Aided Thresholds, Speech Discrimination Scores and also using the Speech, Spatial and Quality of Hearing (SSQ) Questionnaire. A Hearing In Noise Test (HINT) was also performed. Results: 8 patients were prospectively recruited and implanted. There were 5 patients with left sided deafness and 3 patients with right sided deafness. The age ranged from 24-70 years of age and the duration of deafness ranged from 11-55 months. The Tinnitus VAS and THI scores improved in 5 out of 8 patients. All 8 patients had significantly improved aided hearing thresholds with the cochlear implant (27-45dBHL) compared to their preoperative hearing thresholds (55- >110dBHL). Speech Discrimination Scores (SDS) improved substantially for 6 out of 8 patients with the cochlear implant (19-59%) compared to preoperatively (0-10%). The SSQ questionnaire showed improvement in 4 out of 8 patients primarily in the spatial hearing category. The HINT test showed that 6 out of 8 patients could hear better on the cochlear implant side when noise is presented to the normal ear 1 year after surgery. 1 year after surgery, all 8 patients used their cochlear implants on a daily basis. 3 patients used it between 2-4 hours a day, 3 patients used it 4-8 hours a day and 2 patients used it for more than 8 hours a day.

Summary and Conclusion: In the majority of patients, tinnitus was improved and the overall hearing ability was improved in the side with the cochlear implant. This is the first research study in published literature that documents the benefits of cochlear implantation in Single Sided Deafness due specifically to Idiopathic Sudden Sensorineural Hearing Loss and may prove to be a useful guide to counselling such patients on a novel form of hearing restoration for their hearing loss where previously routing of signal treatments were the mainstay.

» **14:20~14:40**

» Partial deafness and cochlear implantation
adults and children

Shinshu University School of Medicine
Shin-ichi USAMI

Background: We have shown that hearing preservation can be achieved in the presence of an electrode covering the residual hearing region (Usami et al., 2011). And we were able to preserve residual hearing in consecutive 32 cases (Usami et al., 2014). In addition to post-lingual progressive hearing loss patients, a considerable number of pediatric patients demonstrate hearing loss involving the higher frequencies. Sound amplification by use of hearing aids is sometimes insufficient, and electric acoustic stimulation (EAS) is an ideal mode of intervention in such cases. In Japan, EAS was approved and reimbursed in 2014, and is becoming a standard therapeutic option for high-frequency involved hearing loss.

Methods: We performed EAS with full insertion of the electrode (24mm FLEX24, 28mm FLEX28, or 31.5mm FLEXsoft). The round window approach was applied to minimize damage to the cochlea during insertion. Intra- and post-operative infusion of dexamethasone was applied.

Results and Discussion: Residual hearing in the lower frequencies was well preserved in all adult cases, and an audio processor was applied for EAS. Speech discrimination test scores were improved. With regard to long-term results, there are two groups; patients with stable hearing and those with progressive hearing loss in the implanted ear. The difference between two groups is related to the rate of progression in the contralateral ear (Moteiki et al., 2017). For the pediatric patients, language development was found to be good. Our results indicate that EAS is a safe and effective intervention for pediatric patients with high-frequency hearing loss.

Conclusion: Less traumatic CI surgery was able to preserve residual hearing both adults and children. The natural course of hearing should be considered for the patients with residual hearing.

» **14:40~14:55**

» Cochlear implantation in severe inner ear anomalies

*Department of Otolaryngology, College of Medicine,
Dong-A University*

Lee-Suk KIM, Sung Wook JEONG

Inner ear anomalies (IEAs) account for 20~40% of children with congenital sensorineural hearing loss and most of them are potential candidates for cochlear implantation (CI). Among various types of IEAs, common cavity, incomplete partition types 1 and 3, cochlear hypoplasia, cochlear aplasia, and cochlear nerve deficiency are considered as severe IEAs. There has been the longstanding concerns on CI surgery for children with severe IEAs for some reasons. CI surgery for children with severe IEAs can be difficult because they are often associated with aberrant course of facial nerve, CSF gusher during surgery and persistent CSF leakage after surgery and the electrode insertion into the internal auditory canal. More importantly the severe IEAs can cause poor speech perception abilities after CI because children with them can also have abnormal distribution of decreased numbers of spiral ganglion cells and a paucity of cochlear nerve fibers. Several publications and data from Dong-A University Hospital have shown that children with severe IEAs can obtain the meaningful benefits from CI if the surgery is performed early in life and a customized habilitation is provided. More favorable speech perception outcome can be expected if the child with severe IEA has good cochlear nerve morphology and receives bilateral CI.

» **14:55~15:10**

» Single side deafness with intractable tinnitus

Seoul National University Hospital
Seung Ha OH

Tinnitus is one of the most troublesome consequence following single-sided deafness (SSD). Although

contralateral routing of signals (CROS-HA) and bone conduction devices have been the traditional treatment for SSD, recently cochlear implant (CI) has increasingly become a promising choice. Among benefit of bilateral hearing such as speech in noise, localization, quality of life(QoL), and amelioration of tinnitus, CI option for SSD demonstrates the most excellent superiority in tinnitus control. Recent study showed that intracochlear electrical stimulation (ie. Looped stimulation) independent of environmental sounds similarly suppress tinnitus without disturbing speech perception (Arts et al., 2017). These findings offer tinnitus implant in patients with significant residual hearing. How can cochlear implantation or intracochlear electrical stimulation suppress the tinnitus is not fully understood. Recent study comparing pre- and post CI quantitative electroencephalography (qEEG) showed overall decreased cortical activity and functional connectivity. However, CI decrease tinnitus not by cortical plasticity but by suppressing tinnitus-related cortical regions by dynamic peripheral reafferentation. (Song et al, 2017) Current progress on CI-SSD research will be presented and modulation mechanism of cortical activity after reafferentation will be discussed.

» 15:10~15:25

» Surgical intervention for auditory neuropathy:
When, why, and to whom?

*Department of Otolaryngology, Ajou University School
of Medicine*

Yun-Hoon CHOUNG

Auditory neuropathy spectrum disorder (ANSD) is a condition caused by altered neural synchrony in response to auditory stimuli. The diagnostic criteria of ANSD includes normal functioning of outer hair cells by examination of otoacoustic emissions, and abnormal or absent function of the cochlear nerve by presence of cochlear microphonic (CM) or by absence or dyssynchrony of the waves in auditory brainstem response test. The primary treatment

for patients with ANSD is the use of hearing aids (HAs). However, limited auditory skill development is often noted despite the appropriate amplification. To overcome this limitation, cochlear implantation (CI) has increasingly been performed in patients with ANSD by high neural synchrony provided by electrical stimulation. Still, ANSD is considered as a factor that can delay the period of CI. The reasons for the delay includes; 1) possibility of hearing threshold improvement over time, 2) patients may not meet the audiometric criteria for CI, despite limited progress with speech & language development as expected from HAs, and 3) residual cochlear hair cell function could be jeopardized by electrode insertion. Due to these issues, indications for when to pursue CI over HA are not always clear in patients with ANSD. Throughout the years, many reports have claimed the positive outcomes of CI in ANSD. Similar to CI in other SNHL, the optimal time (prelingual period) for CI should not be missed in ANSD however, the possibility of spontaneous auditory improvement should always be under consideration. In relations to deciding the candidates of CI in ANSD, one of the major factors is presence or absence of comorbidities. Patients with ANSD may be exposed to higher rates of comorbidities due to the historical features of ANSD including prematurity, NICU care, mechanical ventilation care, maternal ototoxic medication, motor or cognitive developmental delay, hyperbilirubinemia, and intraventricular hemorrhage. These associated conditions may alter the expected outcomes of CI in ANSD. Heterogeneity of clinical manifestations and differential extent of benefits from auditory rehabilitation is noted in ANSD. Thus, a 'step by step' management is required to decide the treatment of choice for patients with ANSD.

OTSP III

RM 3-1 (Emerald A)

Chair : Chul Won PARK, Soe TIN

**State-of-the-art Surgical Techniques
In Otologic Surgery**

» 15:50~16:10

» CO2 Laser in stapes surgery

*Department of Otorhinolaryngology, Seoul National
University Bundang Hospital*
Ja-Won KOO

The aim of stapes surgery is to improve conductive component of hearing loss in case of stapedia fixation. The operation succeeds very well in a very high percentage of cases and is usually not very traumatic for the patients. As the perilymphatic space of the inner ear has to be opened, protecting the inner ear structures during the operation is particularly important. Noncontact opening of the perilymphatic space by laser seems to be gentler to the tissues than using manual perforators. The CO2 laser, in particular, is recommended for its excellent properties: it is well absorbed by tissues such as bone but does not penetrate deeply into fluids such as the perilymph. Laser stapedotomy using CO2 Laser has already been used with great success by several surgical teams. For the time being, the fact that the laser beam is not visible and has to be coupled with a target beam (helium-neon laser) for clinical use may be considered a disadvantage of the system. In clinical practice, therefore, it has to be ensured that the two beams are coupled accurately, to minimize the chances of an erroneous shot. A trial shot outside of the surgical field should be carried out routinely at the start of every operation to check the alignment. A further drawback of the standard CO2 laser in clinical practice is that it has to be coupled to the microscope with a micromanipulator. The fiber-type CO2 laser overcomes this disadvantage of the free-beam type laser as it can be used simply and safely with a handpiece,

even in difficult anatomic situations. A direct comparison between the fiber-type laser and the free-beam type shows no significant difference in bone conduction threshold and hearing outcome. But operation time is significantly shorter in fiber-type laser group. In addition, fiber-type CO2 has practical advantages, especially in cases with difficult anatomic conditions such as facial nerve hanging over the oval window. The surgical procedure of stapedotomy using two kinds of CO2 Laser will be introduced.

» 16:10~16:35

» Endoscopic ear surgery

Chang Gung Memorial Hosp. and Chang Gung Univ.
Chin-Kuo CHEN

In recent decades, the endoscope has been incorporated into ear surgery, namely, myringoplasty, tympanoplasty, cholesteatoma surgery, benign neoplasms of the middle ear, stapedectomy, and neuro-otological procedures. Furthermore, it has been suggested that preservation of as much normal middle ear mucosa with the endoscope can promote the re-aeration of the mastoid cavity leading to better hearing outcomes in surgery. However, the endoscope still remains a new tool for most otologists in the world. Most ear surgeons performed surgeries under the microscope and thought the endoscope as a tool to observe. In this viewpoint, there is similar work to follow the microscope. We started totally endoscopic tour more than 6 years. The modern endoscopic technique has been improved and changed our ways including diagnosis and treatment to patients. Different angles the endoscope supplies, different perspective anatomies come out. The result maybe similar, but the process is different. Moreover, the endoscopic technique and advanced monitor are still developing year by year. Many instruments and smaller devices are also under researched by many companies. In the conference, I will present some experience applying the endoscope to ear surgeries and focus how the endoscope change my clinical practice.

» 16:35~17:00

» Endoscope- assisted microvascular decompression

*Department of Otolaryngology, University Aix Marseille
II L'Hôpital Nord, Marseille, France*
Jacques MAGNAN

» 17:00~17:20

» Transcanal endoscopic ear surgery for pediatric patients

*Department of Otorhinolaryngology, Chonnam
National University Medical School*
Hyong-Ho CHO

In pediatric ear surgery, Endoscopy is advantageous in many aspects, especially for congenital cholesteatoma and chronic otitis media surgery. In the microscopic surgery era, many surgeons prefer post-auricular approach due to the narrow external auditory canal (EAC). Transcanal approach using endoscopy provides many advantage including, visualizing more details with wider view, less invasive eradication of the disease and middle ear reconstruction and capable operation with narrow EAC. In some way endoscopic surgery might be able to substitute former microscopic operation. However, the optimum approach will depend upon the extent of the disease, morphology of the child's ear and surgeon's experience. Here, I will share the endoscopic application methods and results in various types of pediatric ear surgery.

OTOP I

RM 4-1 (Convention A)

Chair : Chang Ho LEE, Seung Geun YEO

Facial Nerve

» **OTOP-01 08:00~08:10**

» Clinical features of facial nerve schwannoma

*Department of Otorhinolaryngology-Head and Neck
Surgery, Asan Medical Center, University of Ulsan
College of Medicine*

**Byung Chul KANG, Mi Rye BAE, Woo Seok
KANG, Joong Ho AHN, Hong Ju PARK, Jong
Woo CHUNG**

Objectives:The aim of this study was to expand the understanding and to help decision making on the timing of surgical intervention for facial nerve schwannoma, which is very rare disease. We investigated the clinical features, treatment results and natural course of facial nerve schwannoma.

Methods:Through the retrospective chart review, we investigated the patients who diagnosed with facial nerve schwannoma at Asan Medical Center for 10 years from 2008 to 2017. We analyzed the involved segment of facial nerve and size on temporal bone magnetic resonance imaging (MRI). In the group with surgical excision, facial nerve function and treatment results were analyzed according to the surgical approach and the methods of facial nerve management. In the group observed with the wait and scan, the facial nerve function and the size change of the tumor were observed.

Results:A total of 47 patients were diagnosed as facial nerve schwannoma by temporal bone MRI. The mean age at diagnosis was 47 years and the mean follow up period was 34 months. The initial facial nerve function was House-Brackmann grade (H-B grade) I-II in 52%, H-B grade III-IV in 41%, and V-VI in 7%. The most commonly

involved segment was tympanic segment (81%), followed by geniculate ganglion (74%) and mastoid segment (70%). 37% of cases were observed with wait and scan, and 62% were with surgical excision. Observation was performed mostly in the patients with H-B grade I-II with no interval change in follow up MRI. Surgical excision was commonly performed for patients with facial palsy above H-B grade III. Postoperative facial nerve function was stable in 59% and deteriorated in 35%.

Conclusions: Facial nerve schwannoma can be observed when the facial nerve function is good at the time of diagnosis and when there is no significant increase in size or facial palsy. Since the facial nerve function is often exacerbated after treatment, the timing and extent of surgical excision is very carefully decided.

» **OTOP-02 08:10~08:20**

» Extended epitympanotomy for facial nerve decompression

Department of Otorhinolaryngology-Head and Neck Surgery, Chuncheon Sacred Heart Hospital, School of
Janet Ren CHAO, Yoo Yeon KIM, Jiwon CHANG,
Jun Ho LEE

Objectives: For a minimally invasive approach to access the facial nerve, we designed an extended epitympanotomy via a transmastoid approach that has proven useful in cases of traumatic facial nerve palsy and pre-cholesteatoma

Methods: To evaluate the surgical exposure through an extended epitympanotomy, six patients with traumatic facial nerve palsy were enrolled in this study. The same surgical technique was used in all patients. Patients were assessed and the degree of facial nerve paralysis was determined prior to surgery, 1 week post-operatively, and 6- months post operatively using the House-Brackmann grading system

Results: In all cases, surgical exposure was adequate. All patients with traumatic facial nerve palsy were male. Age range was 13 to 83 years old. The cause of the trauma was

a motor vehicle accident in 3 patients and a slip/fall in the remaining individuals. In all cases, the location of the facial nerve damage was limited to between the 1st genu and 2nd genu. All patients improved at 6-months post-op ($P=.024$). There were no complications in any of the patients

Conclusions: Extended epitympanotomy is useful for safe, rapid surgical exposure of the attic area, sparing the patient post-operative dimpling, skin incision complications, and lengthy exposure to anesthesia (due to reduced operative time). We suggest that in patients with facial nerve palsy secondary to trauma or in individuals with pre-cholesteatoma limited to epitympanum, and chronic otitis media with intact ossicles surgical treatment be performed using this described technique

» **OTOP-03 08:20~08:30**

» Lower face correction in chronic facial palsy comparative analysis of temporalis muscle transfer, fascia lata, gore-tex, and thread implants

Department Of Otorhinolaryngology-Head And Neck Surgery, Inje University College Of Medicine, Ilsan
Paik Hospital

Byung Hyun HAN, Hae Dong KIM, Yong Seok
JO, Jeon Mi LEE, Jin KIM

Objectives: For the lower face reanimation of chronic facial palsy, many surgical techniques could be used depending on patient's status as well as clinician's experiences. Lower face reanimation has been considered to be a relatively difficult technique due to slow- progression of mouth corner drooping after several years. We compared temporalis muscle transfer, fascia lata, Gore-tex, and thread implants in terms of duration, surgical technique, and patients' satisfaction.

Methods: 34 patients of chronic facial palsy were involved in this study. Most of the patients were managed for severely-deviated mouth corner on affected side. For the correction of deviated mouth, temporalis muscle, fascia lata, allograft fascia lata, Gore-tex, and nylon

1-0 were used with or without face-lifting. The end results were compared by facial symmetry by SB scale, cost-effectiveness, and patient's satisfaction Results:The most well preserved facial function had been shown in temporalis muscle transfer. Lower face reanimation using thread was the most easily-assessed facial correction but also had short duration of action. Fascia lata of auto and allograft had shown well preservation of facial function for long time without any foreign body reaction. Using Gore-tex could not be recommendable due to frequent infections after surgery.

Conclusions:Various surgical techniques could be used for lower face reanimation depending on patient's and clinician's situations, but the most recommendable materials were fascia lata and temporalis muscle for long lasting facial symmetry.

» **OTOP-04 08:30~08:40**

» Effect of local anesthesia on facial nerve blood flow and muscle action potential

*Department of Otolaryngology, Chonnam National
University Medical School*

**Tae Gu KANG, Chul Ho JANG, Eun Kyung
JUNG, Hong Chan KIM, Yong Beom CHO**

Objectives:The effect of direct application of local lidocaine with epinephrine on the facial nerve (FN) has not been reported. The aim of this study is to assess the effects of 2% lidocaine with 1:100,000 epinephrine at clinically relevant concentrations in a rat FN model with respect to facial nerve blood flow (FNBF) and subsequent electrophysiological changes.

Methods:To assess the influence of drugs on FNBF and electrically evoked muscle action potential (EMAP), small pieces of gelfoam were soaked in PBS 100μl (n=5, control group), 50μl (n=5, treatment group A) and 100μl (n=5, group B) of 2% lidocaine with 1:100,000 epinephrine, and 50μl (n=5, group C) and 100μl (n=5, group D) of 2% lidocaine. After 5min of stable

recordings, we applied a 2% lidocaine with or without 1:100,000 epinephrine impregnated gelfoam over the main trunk of the facial nerve of rats for 30min. After removing the applied gelfoam, FNBF and threshold of EMAP were measured separately in each group. Results:Compared to the control group, the treatment groups showed a significant reduction in FNBF in a dose-dependent manner. The maximal reductions in FNBF were observed in all treatment groups for a period after 10min of the application. Synergistic reduction in FNBF was greater in groups A and B than in the lidocaine applied groups (C and D). The maximal increase in the EMAP threshold was observed immediately after the respective drug application in all groups. The greatest increase in the EMAP threshold was observed in group B. The increased EMAP threshold returned to the baseline value within 120min in groups A and C.

Conclusions:From these results, it can be considered that the topical application of lidocaine with epinephrine caused reduction in FNBF and elevation of EMAP threshold. These acute reductions in FNBF and elevations in the EMAP threshold were restored in a time- dependent manner.

» **OTOP-05 08:40~08:50**

» Clinical characteristics of dizziness associated with acute peripheral facial palsy

*Department of Otorhinolaryngology, Eulji University
School of Medicine, Daejeon*

Kudamo SONG, Ho Yun LEE

Objectives:We aimed to assess the clinical significance of dizziness associated with acute peripheral facial palsy (APFP).

Methods:Medical records of patients who visited an otorhinolaryngology clinic at a university hospital and were admitted for treatment of APFP between 2014 and 2016 were thoroughly reviewed.

Results:In total, 15.3% (n=15) of patients had dizziness.

Continuous, rotatory dizziness without exacerbating factors was most common and frequently accompanied by nausea/vomiting. Dizziness disappeared within 1 week during the hospitalization period. Patients with Ramsay Hunt syndrome (31.0%) had dizziness more frequently than those with Bell's palsy (8.7%). In addition, higher hearing thresholds and pain around the ear was reported more often in dizzy patients ($p < 0.05$). Logistic regression analysis revealed that the initial House-Brackmann grade of facial paralysis was solely associated with final recovery, but dizziness was not associated with prognosis. Conclusions: Patients with APFP may have transient dizziness in the early stage, which may be more frequently accompanied by worse hearing thresholds and/or pain around the ear. However, these symptoms including dizziness seem to be unrelated to final prognosis.

OTOP II

RM 3-1 (Emerald A)

Chair : Hyun Joon SIM, Joong Keun KWON

External Ear & Others

» OTOP-06 08:00~08:10

» Surgical treatment and outcomes for repair of congenital aural stenosis compared with atresia

Soree Ear Clinic

Kyung Ray MOON, You-Ree SHIN, Seong-Cheon BAE, Hye Jin LIM, Kwang Sun LEE, Chong-Sun KIM, Young-Myoung CHUN

Objectives: To compare results of surgical treatment in congenital aural stenosis with atresia.

Methods: Retrospective medical record review of patients who underwent surgical repair in patients with congenital aural atresia or stenosis during 8 year period from 2010 through 2017 in Soree ear clinic. Complication rates and

hearing results were compared in patients with atresia ($n = 397$) and with stenosis ($n = 43$).

Results: Postoperative closure of the air-bone gap to 30 dB or less occurred in 63.1% of surgeries performed in patients with atresia, 44.5% of surgeries performed in patients with stenosis. Soft tissue stenosis and bony growth of the external auditory canal were seen in 17.8% of surgeries performed in patients with atresia and 10.9% of surgeries performed in patients with stenosis. External auditory canal cholesteatoma were found in 23.1% of surgeries performed in patients with stenosis.

Conclusions: Repair surgery in both patients with atresia and stenosis. Especially patients with stenosis should be done close observation and performed repair surgery because of the risk of cholesteatoma in EAC. In addition, the possibility of postoperative hearing improvement is higher in patients with stenosis than with atresia. So We highly recommend repair surgery to the patients with stenosis.

» OTOP-07 08:10~08:20

» Auricular reconstruction of acquired ear deformity

Department of Otorhinolaryngology-Head and Neck Surgery, The Catholic University of Korea

Jeong-Hoon OH, Byung-Guk KIM, Ki-Hong CHANG, Su-Bin KIM

Objectives: Despite the ongoing advances in surgical procedures and progress in bioengineering techniques, auricular reconstruction remains a significant challenge in plastic and reconstructive surgery. There are different causes for acquired auricular deformities, including cauliflower ear due to acute perichondritis, recurrent otomastoiditis, and chronic irritating trauma, scar after previous auricular surgery and mass effect due to the growth of tumor. The management options vary with the cause, location and the status of remnant tissue.

Methods: Twelve patients with acquired ear deformities

resulting from cauliflower ear and other conditions which obscure the auricular morphology were included in this study. Various surgical techniques including auricular reconstruction using autogenous rib cartilage to restore normal contour and level of the auricle were performed. Their cosmetic results, patient's satisfaction, ease of technique and the occurrence of the complication were analyzed.

Results:Patients ages ranged from 25 to 63 years. Two cases occurred bilaterally. Seven cases were cauliflower ear, three cases were dissatisfaction after previous auricular surgery, and the remaining two cases were secondary deformity due to tumor growth. Half of patients underwent auricular reconstruction using rib cartilage and the others were reconstructed with nasal septal cartilage, conchal cartilage and sculptured dysmorphic cartilage. None of the patients had severe postoperative complication.

Conclusions:The appropriate reconstructive techniques for the treatment of acquired ear deformity must be carefully selected according to the cause, type and degree of deformity and the availability of donor tissue.

» **OTOP-08 08:20~08:30**

» The gap-prepulse inhibition of the cortical N1-P2 complex in healthy control - The effect of age

¹Interdisciplinary Program for Bioengineering,
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of Medicine and Institute of Medical and Biological
Engineering, Medical Research Center, Seoul National
University

**Do Youn KIM¹, Chiheon KWON¹, Moo Kyun
PARK², Jun Ho LEE², Seung Ha OH², Myung-
Whan SUH², Hee Chan KIM³**

Objectives:The present study aimed to investigate the age-related gap-prepulse inhibition (GPI) of the N1-P2

complex of the cortical auditory evoked potential in healthy younger and older age groups.

Methods:Auditory late responses to the intense sound of the GPI paradigm were obtained from 10 younger subjects and 10 older subjects without tinnitus. The inhibition levels of the N1-P2 complex were assessed at 50- and 20-ms gap durations with 8 kHz and 1.6 kHz background noises.

Results:In 8 kHz background noise with the 50- and 20-ms gap durations, the younger group showed significantly stronger inhibition in the N1-P2 complex than the older group. In addition, in the younger group, the GPI ratio of the 50-ms gap duration was smaller than that of the 20-ms gap duration. Similarly, in 1.6 kHz background noise with 50- and 20-ms gap durations, the younger group had lower GPI ratio than that of the older group. However, significant inhibitions from GPI ratio of 1 were observed in both groups.

Conclusions:These findings suggest that the age-related difference in GPI ratio emerged from temporal processing abilities of each group. The older group with reduced gap recognition ability less clearly separates the stimuli with a gap from that without a gap. On the other hand, the lower GPI ratio of the younger group than that of the older group indicates that the younger group has stronger gap recognition ability. Furthermore, within the younger group, the effect of less challenging stimulus condition can be observed from the smaller GPI ratio with longer gap duration. This suggests that level of difficulty of stimulus condition can be modified to induce different levels of GPI ratio. Although both groups exhibited significant inhibition, the age-related GPI ratio differences should be accounted for in the presentation of an appropriate stimuli as well as in the assessment of levels of GPI ratios. Additional studies on different ages from 20s to 60s are required in the future.

» **OTOP-09 08:30~08:40**

» Clinical outcomes of temporal bone malignancy

*Department of Otorhinolaryngology-Head and Neck
Surgery, Asan Medical Center, University of Ulsan*

College of Medicine

Byung Chul KANG, Yong Han KIM, Woo Seok KANG, Joong Ho AHN, Hong Ju PARK, Jong Woo CHUNG

Objectives: Primary temporal bone malignancy is a very rare disease. We aim to review the clinical feature and survival outcomes of temporal bone malignancy. **Methods:** We retrospectively reviewed medical records, temporal bone magnetic resonance imaging (MRI), and computed tomography (CT) of patients diagnosed with temporal bone malignancy at Asan Medical Center for 20 years from 1997 to 2017. The most common histologic classification was squamous cell carcinoma. We evaluate the survival rate using Kaplan-Meier method and applied the log-rank test to compare the survival outcomes according to the difference of stage and initial treatment. **Results:** A total of 60 patients were diagnosed with primary temporal bone malignancy and squamous cell carcinoma was the most common (73%). The mean age at diagnosis was 62 years and the mean follow up period was 35 months. T stage was T1 25%, T2 9%, T3 14% and T4 52%. For initial treatment, surgical resection was performed in 80% and non-surgical treatment in 20%. Overall 2 years and 5 years survival rate were 57% and 37%. The survival rates of T1 and T2 were 100%, whereas T4 for 2 years 34% and 5 years 6%, indicating poor prognosis and statistically significant difference compared with T1 and T2. The survival rate of surgical resection group was 68% in 2 years and 46% in 5 years, while non-surgical group showed poor prognosis 22% in 2 years and 11% in 5 years. **Conclusions:** Temporal bone cancer was commonly diagnosed at the time of diagnosis as T4 stage, which was extremely poor prognosis. Non-surgical treatment was poor, although the surgical resection tends to be performed for relatively low stage tumors. Early diagnosis at low stage and appropriate surgical resection is most important for good outcome in squamous cell carcinoma of temporal bone.

» **OTOP-10 08:40~08:50**

» The surgical outcomes in children with conductive hearing loss

Department of Otorhinolaryngology, Seoul National University Hospital

Yoonjae SONG, Yong Seok KANG, Seung Ha OH

Objectives: The postoperative outcome of stapedotomy in children is known to be relatively poor than that of adults. The aims of this study were to review the results of stapedotomy in children and to analyze the factors affecting the results.

Methods: The medical records of 27 children (31 ears) who had undergone stapedotomy at Seoul National University Hospital between January 2006 and December 2017 were retrospectively reviewed. The medical history, computed tomography results, intraoperative findings, video clips, and hearing outcomes of all patients were reported.

Results: The mean age of patients was 9.6 ± 3.2 years. Male to female ratio was 17:14 ears and preoperative air-bone gap (ABG) was 42.1 ± 10.1 dB. The postoperative ABG was 13.6 ± 12.4 dB, which was improved statistically significant ($p < 0.001$). After the operation, there were 13 ears (41.9%) with < 10 dB ABG, 13 ears (41.9%) in 10~20 dB ABG and 5 ears (16.1%) with > 20 dB. There were 16 (51.6%) ears of isolated stapedial fixation, 10 (32.2%) ears of stapedial fixation with other ossicular malformations, 4 (12.9%) ears of aplasia of oval window and 1 (3.2%) ear of juvenile otosclerosis in the final diagnosis. Stapedial fixation with other ossicular malformation (22.0 ± 11.6 dB) and aplasia of oval window (21.2 ± 23.2 dB) showed poor ABG than that of isolated stapedial fixation (9.7 ± 5.1 dB) ($p = 0.02$). The result of bilateral conductive hearing loss (19.1 ± 12.2 dB) was worse than that of unilateral (8.9 ± 5.1 dB) ($p = 0.05$). Facial nerve anomaly, operation methods, postoperative symptoms, and length of the piston wire were not associated with results. There was no significant differences with respect to sex. The ears with poor outcomes with

ABG>20dB had operative findings such as observed severe TSP in the tympanic membrane, malleus handle fixation, tight insertion of the piston wire, and short piston wire. Conclusions: Stapedial fixation with other ossicular malformation and aplasia of oval window and bilateral conductive hearing loss may be associated with poor ABG after surgery.

OTOP III

RM 3-1 (Emerald A)

Chair : So Young PARK, Kyu Sung KIM

Basic I

» OTOP-11 10:30~10:40

» Optimized phospholipid-based nanoparticles for inner ear drug delivery and therapy in vivo

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Keum-Jin YANG¹, Ji-Hwan SON², So-Young JUNG³, Gawon YI², Jihye YOO², Heebeom KOO^{2,4}, Dong-Kee KIM³

Objectives: The purpose of this study was to develop a phospholipid nanoemulsion - based drug delivery system for acute hearing loss including sudden hearing loss.

Methods: we prepared four kinds of phospholipid nanoparticles: anionic, neutral, cationic, and cationic-PEG (polyethyleneglycol) particles. To test particle efficacy in vitro, we used an artificial mucosa 100 µm in thickness to model the round window membrane (RWM). and loaded

HEI-OC1 cells with particles containing Nile Red dye. Based on the in vitro results, we selected an optimal particle for further study. We observed the selected particle uptake in organotypic cultures of the organ of Corti. In mice, we analyzed the biodistribution of dexamethasone (Dex) in the inner ear after intratympanic injection of Dex-loaded nanoparticles. We then tested the therapeutic utility of Dex-loaded particles in a mouse model of ototoxicity.

Results: The size of candidate particles was about 200 nm. Four kinds of particles showed similar toxicity in MTT assay between 0.25 to 0.5mg/ml. In the screening tests of candidate particles, cationic-PEG particle showed most favorable results. Cationic-PEG particles loading Dex, were finally applied in vivo. particle was administered in middle ear of ototoxic animal and compared to dexamethasone sodium phosphate (Dex-SP) which is currently in clinical use. Dex delivered at a dilution of 30-fold compared to Dex-SP, but showed almost the same amount of absorption of the inner ear in the drug distribution experiment, and showed better anti-inflammatory and hearing protection results.

Conclusions: Thus, the surface properties of nanoparticles play pivotal roles in particle penetration and distribution after intratympanic injection. Our in vitro screening system using an artificial mucosa will also be valuable in the development of carriers for inner ear drug delivery.

» OTOP-12 10:40~10:50

» In vivo assessment of hair cell damage and developmental toxicity caused by particulate matter 25 exposure using zebrafish (Danio rerio) models

Department of Otorhinolaryngology-Head and Neck Surgery, Korea University Ansan Hospital

Kukjin NAM, Jihye RHEE, Yoon Chan RAH, Saemi PARK, Eunjung HAN, Soonil KOUN, June CHOI

Objectives: The aim of the present study was to evaluate hair

cell damage and associated developmental toxicity caused by particulate matter(PM) 2.5 exposure.

Methods:We divided 90 embryos into three groups; control(0ppm), 500ppm of PM2.5, 1000ppm of PM2.5. We exposed embryos to various concentrations of PM2.5 (500 ppm, 1000 ppm) and evaluated developmental toxicity of the embryos at 24, 48 and 72 hours and hair cell damage at 7, 10 days after fertilization. The evaluation was done with General morphology score (GMS) system, hair cell counting and DASPEI assay. GMS system included detachment of tail, somite formation, eye development, movement, heartbeat, blood circulation, pigmentation of head-body, pectoral fin, pigmentation of tail, protruding mouth. The average number of total hair cells within four neuromasts exposed to various concentrations of PM 2.5 were compared with that of the control group. DASPEI assay enables us to evaluate mitochondrial damage of each cells.

Results:PM2.5 induced significant hair cell damage compared with control group (control vs 500ppm: $p<0.001$; control vs 1000ppm: $p<0.001$) (Mean number of neuromasts: control=13.55, 500ppm= 11.472, 1000ppm=12.775). Sequential analysis of morphologic abnormality ($p<0.26$), heart rate and body length ($p<0.31$) did not show significant difference among groups. DASPEI analysis also could not figure out meaningful difference among groups.

Conclusions:PM2.5 exposure caused significant hair cell damage in zebrafish at developmental stages. However, developmental toxicity and DASPEI assay result did not show statistically significant difference among groups. Further study is needed to investigate mechanism of hair cell damage

» **OTOP-13 10:50~11:00**

» Effect of BMP2-platelet-rich plasma-biphasic calcium phosphate scaffold on accelerated osteogenesis in mastoid obliteration

Department of Otolaryngology, Chonnam National

University Medical School

**Sung Min JIN, Chul Ho JANG, Chung Man
SUNG, Hong Chan KIM, Yong Beom CHO**

Objectives:The aim of this study was to evaluate the synergistic effect of platelet-rich plasma (PRP) and recombinant human bone morphogenic protein (BMP)-2 on accelerated osteogenesis of hydroxyapatite/ β - tricalcium phosphate mixture and biphasic calcium phosphate (BCP) in mastoid obliteration. To the best of our knowledge, there have been no studies reporting the enhancing effects of BCP, combined with BMP2 and PRP, on osteogenesis in mastoid obliteration. **Methods:**Mastoid obliteration was performed in a control group (BCP only, n=7), a group treated with BMP2 and BCP (experimental group I, n=7), and a group treated with BMP2, PRP and BCP (experimental group II, n=7). The animals were administered fluorescent bone labels for a qualitative evaluation of bone formation; oxytetracycline hydrochloride was administered at 2 weeks, calcein at 4 weeks, and alizarin red at 8 weeks. The animals were sacrificed 12 weeks post- surgery and osteogenesis was evaluated by micro-computed tomography, histological investigation, and histomorphometry.

Results:Microcomputed tomographic analysis showed more effective osteogenesis at 8 weeks in both experimental groups compared to the control group. However, there were no significant differences between the experimental groups. Histomorphometric findings of new bone formation showed significantly enhanced osteogenesis in both experimental groups than in the control group. However, there were no significant differences between the experimental groups; $p<0.05$. Confocal microscopy showed more enhanced intensity in both experimental groups than in the control group at 2,4, and 8 weeks. However, there were no significant differences between the experimental groups.

Conclusions:From these results, it can be concluded that BMP2-activated BCP can enhance bone regeneration. However, there was no synergistic effect of BMP2 and PRP

on osteogenesis of BCP. Further studies are required to elucidate the clinical applications of PRP.

» **OTOP-14 11:00-11:10**

» Changes of cochlea glucocorticoid receptor and serum corticosterone in noise induced hearing loss animal model a comparison of administration time of dexamethasone

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Seung Hun LEE¹, Sun-Ae SHIN^{1, 2}, Ah-Ra LYU^{1, 2}, Yong-Ho PARK¹

Objectives:Glucocorticoids are hormones secreted from the adrenal cortex in response to stress and are used for the treatment of various inner ear diseases. It is mainly present in rodents as a corticosterone and acts by binding to the glucocorticoid receptor (GR). The purpose of this study was to investigate the changes in cochlear GR and serum corticosterone levels following noise exposure. In addition, we aimed to investigate the effect of dexamethasone (DEX) when administered at different time points.

Methods:Seventy-five CBA/J mice were used for this study. Animals were divided into two groups according to the noise exposure level (transient threshold shift group (TTS), permanent threshold shift group (PTS). Changes in auditory brainstem response (ABR) thresholds were measured, and the changes in gene expression of GRmRNA and inflammatory cytokines were evaluated using real time polymerase chain reaction (qRT-PCR), Serum corticosterone was evaluated by enzyme-linked immunosorbent assay (ELISA). Changes in the cochlea hair cells were observed using immunohistochemical staining. DEX was administered before, after, and before and after the noise exposure.

Results:The expression of GR gene was significantly

decreased after noise exposure, and the serum corticosterone levels and inflammatory cytokines were increased. On DEX administration, GR mRNA expression was further decreased in the TTS group, but not in the PTS group. Serum corticosterone levels and inflammatory cytokines were significantly decreased when DEX was administered before and after exposure to noise. The hair cells of the TTS group were almost preserved, but the PTS group was mostly destroyed.

Conclusions:Serum corticosterone level and GR expression are important for maintaining cochlear homeostasis and DEX administration before acoustic trauma seems to be more appropriate to prevent noise induced hearing loss.

» **OTOP-15 11:10~11:20**

» Effect of amniotic membrane extract on the hyperplastic response of middle ear mucosa in bacterially induced otitis media rat model - Preliminary study -

Department of Otorhinolaryngology-Head and Neck Surgery, Dongguk University Ilsan Hospital

Joo Hyun PARK, Hee Bok KIM, Seo Hyun KO, Yun-Sung LIM, Seok-Won PARK, Chang Gun CHO

Objectives:Human amniotic membrane extracts (AME) have been known to contain numerous bioactive factors and anti-inflammatory substances. However, anti-inflammatory effects of AME on middle ear (ME) mucosa are unclear. This study assessed the effect of AME in the growth of the bacterially induced ME mucosa.

Methods:Otitis media (OM) was induced by inoculation of nontypeable Haemophilus influenza (NTHi) into the ME cavity of rats. ME mucosal explants were cultured with AME. Explants were cultured with AME concentration of 0, 5, 10, or 50 µg/mL, respectively. The area of explant outgrowth was measured and analyzed until 7 days (1, 3, 5 and 7 days after explantation) in culture. Expression of Ki-67, MUC5ac, TNF- α , and IL-10 in explant was also

evaluated using quantitative polymerase chain reaction (qPCR) and immunocytochemistry (ICC).

Results: Growth of NTHi induced ME mucosa increased gradually for 7 days in all explants with different AME concentration. There was a tendency for mucosal growth inhibition at higher concentration of AME, although the growth was not significantly different until 5 days among groups. ME mucosal explants treated with 50 µg/mL AME showed significantly suppressed growth on post-explantation 7 day, compared with other explants on the same day. PCR and ICC staining revealed that expression of Ki-67, MUC5ac, TNF- α , and IL-10 was further decreased in explants with higher concentrations of AME than those with lower concentrations of AME.

Conclusions: Our study results showed that higher concentrations of AME reduced mucosal proliferative response during bacterial OM in rats. These findings support the influence of AME on the inflammatory and proliferative responses to NTHi infection of ME mucosa.

» **OTOP-16 11:20~11:30**

» Effect of electronic-cigarette on human middle ear epithelial cells

*Department of Otorhinolaryngology-Head and Neck
Surgery, Korea University College of Medicine*
**Yoon Young GO, Shin Hye KIM, Sung-Won
CHAE, Jae-Jun SONG**

Objectives: It has been shown that cigarette (E-cig) exposure can affect otitis media in our previous study. However, harmful effect of E-cig on human middle ear has still unknown. The aim of this study was to examine cytotoxicity of E-cig in human middle ear epithelial cells (HMEECs).

Methods: Cell viability was determined using the CCK8 assay following E-cig treatment. We investigated the expression of an inflammatory cytokine (COX-2 and TNF- α) genes and a mucin gene (MUC4) using qRT-PCR. Increases in COX-2 and TNF- α proteins were

determined by western blot.

Results: Exposure to IC50 value of electronic-cigarette caused a significant decrease in HMEEC viability. The protein levels of COX-2 and TNF- α increased in menthol and cigarette flavor E-cig. Especially, treatment of cigarette flavor E-cig markedly increased these inflammatory proteins. E-cig exposure also induced mucin gene expression in HMEEC.

Conclusions: We found that E-cig exposure induced inflammation, and increased mucin gene expression in HMEEC. These results indicate that E-cig exposure may be related to the development of otitis media.

OTOP IV

RM 3-1 (Emerald A)
Chair : Eui Cheol NAM, Sung Hee KIM

Tinnitus

» **OTOP-17 11:30~11:40**

» Paper patching is enough for treatment of patulous eustachian tube

*Department of Otorhinolaryngology, Eulji University
School of Medicine, Daejeon*
Kudamo SONG, Ho Yun LEE

Objectives: We aimed to assess treatment outcome of patulous eustachian tube according to different treatment strategy.

Methods: Between March 2014 and September 2017, 39 patients with patulous Eustachian tube were treated with one of the two: 23 patients underwent paper patching on the tympanic membrane; other 16 patients were treated with nasal saline irrigation with or without ipratropium bromide monohydrate nasal spray. Changes in patients' symptoms after treatment and follow-up results analyzed.

Results: For initial symptoms, aural fullness (87.2%, n=34)

was most common, followed by autophony (n=23, 59%), and tinnitus (n=15, 38.5%). Oto-endoscopy revealed that the movement of the tympanic membrane was observed in 33 (84.6%). Immediately after paper patching, 20 of the 23 patients (87.0%) reported their aural discomfort totally disappeared, and 2 patients (8.7%) said the severity of discomfort decreased. There was no change in symptoms with 1 person (4.3%). Fisher's exact test revealed that the symptomatic change was different according to whether patients underwent paper patching or not ($p < 0.001$). This trend was still observed until three months' follow-up ($p = 0.002$).

Conclusions: Paper patching is very simple, effective and non-invasive treatment for patulous Eustachian tube in an outpatient clinic.

» **OTOP-18 11:40~11:50**

» **Prognostic factors for the outcomes of intratympanic dexamethasone in the treatment of acute subjective tinnitus**

*Department of Otorhinolaryngology-Head and Neck
Surgery, Eulji University School of Medicine, Eulji
Medical Center*

Eun Sub LEE, Yong-Hwi AN, Hyun Joon SHIM

Objectives: Although the therapeutic effect of intratympanic dexamethasone (ITD) injection for acute subjective tinnitus (AST) is still controversial, ITD is used empirically to recover the immediate damage of cochlea. This study aimed to determine prognostic factors for the outcomes of ITD on AST through comparison of the clinical and audiologic characteristics between cure group and non-responder group.

Methods: We enrolled patients who were treated with ITD within 3 months from the onset of tinnitus between 2013 and 2017. We defined cure group (n=38, 45.6 ± 13.3 yrs) as patients who showed complete resolution of symptom with changes in visual analogue scale (VAS) for tinnitus loudness and time of tinnitus awareness to 0 after

treatment. Non-responder group (n=40, 48.9 ± 18.6 yrs) is defined as patients who reported 1) increase or a ≤ 2 point decrease in the VAS, 2) an increase or a $\leq 10\%$ decrease in the percentage of daily tinnitus awareness, or 3) an increase or a ≤ 20 point decrease in Tinnitus Handicap Inventory (THI) at 3 months after ITD treatment.

Results: Mean tinnitus duration before ITD was shorter in cure group than non-responder group (25.4 ± 24.1 vs. 45.3 ± 29.7 days, $p=0.002$). Pure tone average was lower in cure group than non-responder group (17.3 ± 11.8 vs. 25.7 ± 28.0 dB HL, $p=0.018$). Cure group was predominantly female compared to non-responder group (M:F 9:29 vs. 23:17, $p=0.002$). Percentage of daily tinnitus awareness was shorter in cure group ($51.6 \pm 30.4\%$ vs. $69.0 \pm 30.8\%$, $p=0.014$). Prevalence of immediate noise exposure was lower in cure group (6/38 vs. 15/40, $p=0.031$). However, there were no differences in subjective tinnitus loudness, THI score, pitch and loudness in the tinnitogram, audiometric asymmetry and DPOAE abnormalities between two groups.

Conclusions: Short duration of tinnitus, low hearing threshold, female, low percentage of daily tinnitus awareness, and no history of immediate noise exposure could be favorable prognostic factors for ITD treatment on AST.

» **OTOP-19 11:50~12:00**

» **Phantom perception of sound and the abnormal cortical inhibition system**

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Surgery, Seoul National University Hospital, ²Medical
Research Center, Seoul National University College of
Medicine*

**Jeong-Sug KYONG^{1,2}, Tae-Soo NOH¹, Moo-Kyun
PARK¹, Jun-Ho LEE¹, Seung-Ha OH¹, Myung-
Whan SUH¹**

Objectives: Tinnitus-related hyper-excitation is assumed to be suppressed by inhibitory repetitive transcranial magnetic

stimulation (rTMS). However, the neural mechanism underlying the treatment is not fully understood; furthermore, quantifying the suppression induced by rTMS has yet to be considered. We evaluated the effect of rTMS on the cortical inhibition status.

Methods: Patients with chronic tinnitus participated with written consent and were randomly allocated to a treatment group (dual-site temporal- auditory group TF, auditory group T and sham group S). rTMS (or sham) was administered for 4 consecutive days. Tinnitus Handicap Index (THI) was given and electroencephalography was performed before and after rTMS treatment. Main outcome measures included changes in the THI score induced by rTMS and functional changes in the electrophysiological signatures. The cortical excitation status was estimated using the ratio in paired-pulse suppression (PPSI) depending on treatment groups and subjective responsiveness to the treatments. **Results:** The Δ PPSI values among the three treatment groups were significantly different ($p = 0.035$). A post hoc test using Bonferroni correction for multiple comparisons indicated that the TF group (-17.57 ± 7.47) was significantly different from the T (6.94 ± 6.46 , $p = 0.023$) and S (6.78 ± 7.29 , $p = 0.024$) groups. The Δ PPSI of the responder group (-11.12 ± 5.94 , $n=8$) was significantly lower than that of the non-responder group (4.89 ± 3.59 , $n=8$). Correlation analyses showed that the Δ THI was correlated with the Δ PPSI in the responder group ($RHO = 0.68$, $p = 0.04$). **Conclusions:** The TF group showed the greatest decreases in the PPSI and THI score after rTMS. The T and S groups did not benefit from the treatment. Our results suggest that rTMS is a beneficial therapeutic treatment for chronic tinnitus patients specifically with dual-site (temporal-auditory) stimulation paradigm evidenced in the decreased cortical disinhibition after treatment.

» **OTOP-20 12:00~12:10**

» **Effect of tinnitus retraining therapy: A self-controlled case series study**

Department of Otorhinolaryngology-Head and Neck Surgery, Seoul St. Mary's Hospital, College of Medicine, The Catholic University of Korea, Seoul, Korea

**Jung Mee PARK, Jung Ju HAN, Dong Kee KIM,
So Young PARK, Shi Nae PARK**

Objectives: Tinnitus retraining therapy (TRT) has been known to be an effective treatment modality for tinnitus patients. This self-controlled case series study was performed to verify the therapeutic effect of TRT.

Methods: Data from 224 patients who received TRT after being diagnosed with subjective sensorineural tinnitus at our clinic of tertiary referral center, Seoul St. Mary's Hospital, from July of 2014 to November of 2016 were collected. This retrospective analysis compared initial tinnitus severity visual analogue scores (VAS) and tinnitus handicap index (THI) with pre-TRT scores, obtained after 3 month treatment of only medication, and also with post-TRT scores obtained 3 months after TRT.

Results: Tinnitus severity VAS scores of awareness (AW), annoyance (AN), and effect on life (EOL) significantly improved after medication only period, but not with loudness (LD) and THI. However, after 3 months of TRT, all categories of tinnitus VAS scores and THI improved with statistical significance. ($\leq P = .05$) The number of patients with 20 points or more improvement in THI scores before TRT was 31 (13.8%), whereas after TRT, 56 (25%). Analysis of clinical characteristics showed patients with improved THI before TRT had significantly shorter duration of tinnitus symptoms, 20.1 ± 36.8 Vs. 40.1 ± 63.8 months. ($P = .013$) The group with improved THI after TRT included younger patients, 49.1 ± 15.3 Vs. 54.4 ± 11.7 years. ($P = .017$)

Conclusions: This self-controlled case series study supports the efficacy of TRT over treatments confined to medication. Patients in younger age may benefit more from TRT compared to older patients.

» **OTOP-21 12:10~12:20**

» Cortical activity modulation by dynamic peripheral reafferentation a preliminary report on cochlear implant-induced cortical changes in single-sided deafness with tinnitus

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Jae-Jin SONG¹, Kyungsoo KIM², Paul Van de HEYNING³, Ji-Woong CHOI²

Objectives:The exact mechanism of tinnitus suppression after cochlear implantation (CI) in single-sided deafness (SSD) is not fully understood. In this regard, by comparing pre- and post-CI quantitative electroencephalography (qEEG), we explored cortical changes relevant to tinnitus improvement.

Methods:In SSD patients who underwent CI, qEEG data was collected: 1) before CI, 2) 6 months postoperatively with CI-on, and 3) 30 minutes after CI-off and source-localized cortical activity/functional connectivity analyses were performed. Source-localization and functional connectivity analysis were performed using sLORETA toolbox.

Results:Compared to the preoperative baseline, the CI-on condition demonstrated significantly decreased activity in the right auditory- and or bitofrontal cortices(OFC) for the delta frequency band as well as decreased connectivity between the auditory cortex/posterior cingulate cortex for the delta/beta2 bands. Meanwhile, compared to the CI-off condition, the CI-on condition displayed decreased activity in the right auditory cortices/OFC for the delta band, and in bilateral auditory cortices, left inferior frontal cortex/OFC for the gamma band. However, qEEG analyses showed no significant differences between the CI-off and baseline conditions.

Conclusions:CI alleviated tinnitus due to overall decreased

cortical activity and functional connectivity. However, judging from no differences between the CI-off and baseline conditions, CI decrease tinnitus not by cortical plastic changes, but by suppressing tinnitus-related cortical regions by dynamic peripheral reafferentation.

» **OTOP-22 12:20~12:30**

» Role of preoperative air-bone gap in tinnitus outcome after tympanoplasty for chronic otitis media with tinnitus

Department of Otolaryngology, Chonnam National University Medical School

**Hong Chan KIM, Chul Ho JANG,
Young Yoon KIM, Jong Yuap SEONG,
Sung Hoon KANG, Yong Beom CHO**

Objectives:Previous reports indicated that middle ear surgery might partially improve tinnitus after surgery. However, until now, no influencing factor has been determined for tinnitus outcome after middle ear surgery. The purpose of this study was to investigate the association between preoperative air-bone gap (ABG) and tinnitus outcome after tympanoplasty type I.

Methods:Seventy-five patients with tinnitus who had more than 6 months of symptoms of Chronic Otitis Media (COM) on the ipsilateral side that were refractory to medical treatment were included in this study. All patients were evaluated through otoendoscopy, pure tone/speech audiometer, questionnaire survey using Visual Analog Scale (VAS) and Tinnitus Handicap Inventory (THI) for tinnitus symptoms before and 6 months after tympanoplasty. The influence of preoperative Bone Conduction (BC), preoperative ABG, and postoperative ABG on tinnitus outcome after the operation was investigated.

Results:The patients were divided into two groups based on preoperative BC of less than 25dB (n=50) or more than 25dB (n=25). The postoperative improvement of tinnitus in both groups showed statistical significance. Patients whose preoperative ABG was less than 15dB showed no

improvement in postoperative tinnitus using VAS ($p=0.889$) and THI ($p=0.802$). However, patients whose preoperative ABG was more than 15dB showed statistically significant improvement in postoperative tinnitus using VAS ($p<0.01$) and THI ($p=0.016$). Postoperative change in tinnitus showed significance compared with preoperative tinnitus using VAS ($p=0.006$). However, the correlation between reduction in VAS score and ABG ($p=0.202$) or between reduction in THI score and ABG ($p=0.290$) was not significant.

Conclusions: We suggest that the preoperative ABG can be a predictor of tinnitus outcome after tympanoplasty in COM with tinnitus.

OTOP V

RM 2-1 (Flamingo)

Chair : Chul Ho CHANG, Seong-Ki AHN

Otitis Media & Cholesteatoma I

» OTOP-23 13:30~13:40

» Analysis of risk factors for myringosclerosis formation after myringotomy with ventilation tube insertion

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Ki Wan PARK¹, Seung Hun LEE¹, Sun-Ae SHIN^{1,2}, Ah-Ra LYU^{1,2}, Yong-Ho PARK¹

Objectives: The aim of this study was to find out the possible risk factors of myringosclerosis (MS) formation after myringotomy with ventilation tube insertion (M with VTI).

Methods: A total of 582 patients who underwent M with

VTI were enrolled in this study. Patients were divided into two groups according to the presence (MS+ group) or absence of MS (MS- group). The base line characteristics of patient including age, gender, characteristic of effusion, duration of effusion, type of ventilation tube (VT), duration and frequency of VTI, post VTI Infection, intraoperative bleeding and the presence of postoperative permanent perforation after VTI were analyzed in both MS+ and MS- groups. The severity of MS was also analyzed according to the possible risk factors.

Results: Of 582 patients, MS was developed about 28.9% in 168 patients after M with VTI. The mean age of MS+ group was older than MS- group ($p<0.05$). The MS after M with VTI was more frequent in older patients than younger and there was more MS in serous otitis media (OM) than mucoid OM, type 2 VT than type 1 VT, presence of post VTI permanent perforation and frequent VTI group ($p<0.05$). However, there were no differences in gender, duration of effusion, duration of VT positioning, post VTI infection, intraoperative bleeding between MS+ and MS- groups. The severity of MS was associated with duration of effusion and frequency of VTI. Conclusions: These results suggest that the older patient, serous effusion of middle ear, type 2 VT, presence of post VTI permanent perforation and frequent VTI would be the risk factors of MS formation after M with VTI. The severity of MS was associated with duration of effusion and frequency of VTI.

» OTOP-24 13:40~13:50

» The effect of tonsillectomy with adenoidectomy on otitis media based on national sample cohort data of Korean national health insurance service

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Junhui JEONG¹, Jaesung NAM¹, Jung Kyu CHOI², Hyang Ae SHIN¹, Jung Hyun CHANG¹,

Hyun Seung CHOI¹

Objectives: We investigated the effect of T&A on otitis media using the National Health Insurance Service National Sample Cohort data in Korea. In this study we focused on the number and cost of medical service use which had not been analyzed to reveal the effect of T&A before.

Methods: This study included data from National Health Insurance Service National Sample Cohort data in Korea. The data is composed of the patient who had T&A from 2002 to 2013. The control group was established according to the patient group who had T&A in 2005 and both groups had similar trends. From 3 years before T&A through 8 years after T&A, the number and cost [total and average (per case)] of medical service use associated with otitis media were analyzed. Main diagnostic codes which were defined as otitis media in Korean Classification of Diseases were used.

Results: Total number of otitis media was 1,338, which consisted of 227 in T&A group and 1,111 in non-T&A group. The number of medical service use was not different significantly between T&A and non-T&A groups before and after surgery. The total and average (per case) cost of medical service use was significantly higher in T&A group than in non-T&A group in one year before surgery. The total cost of medical service use was not different significantly between two groups after surgery. The average (per case) cost of medical service use was not different significantly between two groups after more than two years since surgery.

Conclusions: There were no significant differences in the number of medical service use associated with otitis media between T&A and non-T&A groups before and after surgery. But for the cost of medical service use associated with otitis media, T&A is thought to be helpful to decrease the cost. The significance of this study is that it was a large-scaled population-based big data study to reveal the effect of T&A on otitis media. The results will help to make the appropriate policy for management of T&A and otitis

media in terms of medical service use.

» **OTOP-25 13:50~14:00**

» Tympanic membrane grafting underlay periosteal versus inlay cartilage grafts; A comparative study

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Ahmed EL BATAWI, MD¹, Mostafa ELTAHER, MD², Mohamed SABAA, MD¹

Objectives: Infection of the middle ear has been a problem encountered in the human race it is as old as humanity itself. Tympanoplasty was introduced by Zollner and Wullstein in 1952 for closure of the perforated tympanic membrane (TM). Numerous grafting materials and methods of placement have been described.

Methods: One hundred forty nine patients were involved in this retrospective study. Patients were classified into two groups. Group A (88 patients underwent underlay periosteal TM grafting), Group B (61 patients subjected to inlay cartilage tympanoplasty).

Results: Group A success rate was 93% with mean closure of air bone gap 6.6 dB while Group B success rate was 92% with mean closure of air bone gap 12.1 dB.

Conclusions: Both underlay periosteal and inlay cartilage grafts show high rates of graft take, with relatively better hearing results using the underlay periosteal grafts but shorter operative time with the inlay cartilage grafts.

» **OTOP-26 14:00~14:10**

» Frequency of cholesteatoma in chronic suppurative otitis media and its management - A retrospective study

Dep. of Otorhinolaryngology, Fatima Hosp., Baqai Med Univ

Syed Salman HASHMI

Objectives:To evaluate the frequency of Cholesteatoma among patients presenting with discharging ears (CSOM), so that these patients may be evaluated and managed appropriately to avoid life dangerous complications.

Methods:It is a retrospective cohort study conducted at department of Otorhinolaryngology Jinnah Post Graduate Medical Center (JPMC) Karachi. All patients with clinical diagnosis of CSOM, presenting to department during June 2007 to June 2012, were included in the study by using probability purposive sampling technique. Patients who had some serious systemic illness, those who were unfit for surgery and those who refused were excluded. After obtaining an informed written consent patients were given a questionnaire about the disease. Patients were subjected to management and planned follow-up for 12 months. The results were later compared.

Results:Total 11677 patients presented during the study period. Mean age was 21.7 years with slight female preponderance (55 %). Mucosal disease was seen in 519(76.6%) whereas squamous in 158(23.3%) patients. Cholesteatoma was diagnosed in 157 (23%) patients. Complications were identified in a total of 74(10.93%) patients, with an incidence of intracranial complications as 1.18% (8 patients). Patients with neglected CSOM had a higher incidence of complications

Conclusions:In our study overall incidence of cholesteatoma is 19.3% which is higher as compared to international studies. If not managed properly CSOM with cholesteatoma can lead to fatal complications. Therefore, it is necessary to evaluate every patient of CSOM carefully for early recognition and management of disease in order to prevent intra and extra cranial complications and associated morbidities.

» **OTOP-27 14:10~14:20**

» Endaural laser-assisted single stage inside-out cholesteatoma surgery (eLASIC) to treat advanced congenital cholesteatoma

Department of Otorhinolaryngology-Head and Neck

Surgery, CHA University College of Medicine
**Chang Ho LEE, Mi Kyung KIM, Hyoung-Mi KIM,
Cheongse WON, Tae Hyun SHIN, So Young KIM**

Objectives:The aim of this study is to report surgical and audiologic outcomes of endaural laser-assisted single stage inside-out cholesteatoma surgery (eLASIC) to treat advanced congenital cholesteatoma.

Methods:Study Design: A retrospective case review.

Setting: An otology referral clinic of a university hospital.

Patients: Two hundred consecutive pediatric patients with advanced congenital cholesteatoma (CC), with a mean age at the time of operation of 41.6 ± 16.4 months, were enrolled. Advanced CC was defined as CC involving the incudostapedial joint or mastoid area. **Interventions:** eLASIC and postoperative follow-up TBCT performed at 8–24 months. **Main Outcome Measures:** Residual or recurrent CC by surgical stage and audiological outcomes.

Results:Advanced CC patients included 109 (54.5%) cases of the anterior type and 91 (45.5%) cases of the posterior type. Preoperative differentiation of anterior vs. posterior type by TBCT according to its cochleariform process abutment was useful, because anterior type showed early stapes superstructure (SS) invasion at surgery, that incus removal was frequently needed despite preoperative good hearing. Anterior type also resulted in significantly poor outcome regarding residual CC and postoperative HL compared to posterior type; which was 11.1% vs. 3.3% on recidivism ($p = 0.05$). CC that had destructed SS had a significantly higher residual cholesteatoma (16.7%, 11/66) compared to the intact SSs(3.0%, 4/134). LASIC was feasible in 98.0% of patients, and single-stage ossicular reconstruction was performed in 97.4% (191/196) together with attic cartilage reconstruction. Normal hearing (≤ 20 dB) was achieved in 59.0%, and preserved in 84.5%, but worsened in 15.5% of children. Postoperative >20 dB HL was significantly frequent in anterior type (62.4%) than posterior type (11.0%).

Conclusions:Endaural LASIC enabled minimally invasive surgery and single- stage ossicular reconstruction, without

compromising recidivism or audiological outcomes.

» **OTOP-28 14:20~14:30**

» Comparative analysis of temporal bone CT and diffusion MRI in early attic cholesteatoma

*Department of Otorhinolaryngology-Head and Neck
Surgery, Kangbuk Samsung Hospital, Sungkyunkwan
University School of Medicine*

**Woojoo NAM, Jin Su PARK, Jung Yup LEE, Sun
O CHANG, Min-Beom KIM**

Objectives:To compare the temporal bone CT (TB CT) and non-EPI diffuse weighted MRI in determining the actual extent of early attic cholesteatoma

Methods:Total 6 patients of early attic cholesteatoma were enrolled in this study. All patients had prior history of otorrhea, mild conductive hearing loss, attic destruction without tympanic involvement on endoscopic exam. They were performed TB CT, diffusion weighted MRI (DWI) using non-EPI technique in preoperatively. Surgical video recording and pathology were compared with CT and MRI for the evaluation of actual extent of cholesteatoma.

Results:In TB CT analysis, all 6 patients showed soft tissue attenuation in attic and mastoid antrum. 4 patients also had soft tissue attenuation in whole tympanum and over antrum to the mastoid cavity. The other 2 patients didn't show attenuation in tympanum and had sclerotic mastoid so that soft tissue attenuation can't be seen in mastoid cavity. In DWI analysis, 4 patients had high signal in attic only, 1 patient in attic, antrum and tympanum. The other one patient showed no high signal in DWI. Operational findings were identical to DWI which also matched with pathology. There was retraction pocket only during surgery in one patient with negative DWI. However, DWI had significant low resolution of image compared to TB CT due to its technical limitation.

Conclusions:Non-EPI DWI was superior to TB CT scan in determining actual extent of cholesteatoma. However, due to low resolution of DWI, both DWI and TB CT should

be complementary used each other for the diagnosis and treatment of cholesteatoma.

OTOP VI

RM 2-1 (Flamingo)

Chair : Young Seok CHOI, Bo Hyung KIM

Inner Ear I

» **OTOP-29 14:30~14:40**

» The clinical values of video head impulse test in sudden sensorineural hearing loss

*Department of Otorhinolaryngology, Hanyang
University College of Medicine*

**Jae Ho CHUNG, Sang Gyu PARK, Song Jae
LEE, Hayoung BYUN, Seung Hwan LEE, Chul
Won PARK**

Objectives:The aim of this study was to investigate the clinical value of video head impulse test (vHIT) in sudden sensorineural hearing loss

Methods:From January 2015 to December 2017, one hundred thirty-five idiopathic sudden sensorineural hearing loss patients who completed vHIT were analyzed. All patients received high dose steroid therapy and intratympanic steroid injections as a salvage treatment. Treatment results were evaluated 3month after the start of treatment, according to Siegel's criteria. We analyzed the association between vHIT results and other clinical parameters of ISSNHL. And the relationships between hearing recovery and vestibular function tests were also assessed.

Results:Fifty-one (51/135, 37.8%) patients showed abnormal vHIT results of low gain (< 0.7) or presence of corrective saccade in more than one semicircular canal. According to Siegel's criteria, completely recovered patients had significantly fewer vHIT abnormality in the horizontal

and posterior semicircular canal, respectively ($p=0.038$, $p=0.000$). According to a univariate analysis, initial hearing level, canal paresis, vHIT results of horizontal and posterior semicircular canals were associated with complete recovery. In a multivariate analysis showed that complete recovery of hearing was significantly associated with the vHIT result of posterior semicircular canal (OR 7.856, $p=0.013$).

Conclusions: The recovery of hearing loss was significantly associated with the function of the posterior semicircular canal which was received the same arterial supply with cochlear by the common-cochlear artery. Abnormal posterior canal vHIT might be associated with the vascular cause of ISSNHL which usually accompanied with poor prognosis

» **OTOP-30 14:40~14:50**

» The efficacy of stellate ganglion block added to steroid therapy for idiopathic sudden sensorineural hearing loss

Department of Otorhinolaryngology-Head and Neck Surgery, School of Medicine, Kyungpook National University, Daegu

Myung Hoon YOO, Eun Joo CHA, Da Jung JUNG, Sang Heun LEE, Kyu-Yup LEE

Objectives: Efficacy of stellate ganglion block (SGB) added to steroid therapy in sudden sensorineural hearing loss (SSNHL) is controversial. The aim of this study was to compare the results of simultaneous SGB and steroid with routine steroid therapy in SSNHL patients.

Methods: Retrospective review was done from 216 patients of SSNHL treated at a tertiary university hospital. Control group (75 patients) received 10 days of systemic steroid with additional intratympanic dexamethasone injection. SGB group (141 patients) were treated with same steroid therapy (systemic and intratympanic) as well as SGB. Pure tone audiometry (PTA) was done at pretreatment and 2 months after treatment. Siegel's criteria were used for treatment outcomes.

Results: According to Siegel's criteria, the overall improvement rate was 64.5% in SGB group and 50% in control group, which was statistically significant ($p<0.05$). Average PTA improvement at 2 months were 27.1 ± 25.1 in SGB group and 20.0 ± 24.6 in control group, which was statistically significant ($p<0.05$). Average speech discrimination score improvement at 2 months were 35.1 ± 36.2 in SGB group and 27.9 ± 34.9 in control group, which was not statistically significant. There was no serious complication related to SGB treatment.

Conclusions: SGB appears to be safe and effective for improving hearing results when simultaneously performed with steroid therapy in SSNHL.

» **OTOP-31 14:50~15:00**

» Association of sudden sensorineural hearing loss with risk of cardiocerebrovascular disease a study using data from the Korea national health insurance service

¹Department of Otorhinolaryngology, Myunggok Medical Research Institute, College of Medicine, Konyang University, ²Department of Preventive Medicine, Konyang University College of Medicine, ³Department of Otorhinolaryngology-Head and Neck Surgery and Institute of New Frontier Research, Chuncheon Sacred Heart Hospital, Hallym University College of Medicine

Jong-Yeup KIM¹, Jee Young HONG², Dong-Kyu KIM³

Objectives: The interruption of vascular supply to the cochlea has been proposed as a major etiological factor for sudden sensorineural hearing loss (SSNHL), and several risk factors for cardiocerebrovascular disease (CCVD) are associated with SSNHL, including heavy smoking, alcohol consumption, and thromboembolic events. However, the link between SSNHL and CCVD has not been fully evaluated. To investigate the association between SSNHL and CCVD.

Methods:A retrospective propensity score-matched cohort study was conducted using a nationwide representative sample from the National Sample Cohort 2002 through 2013 data from the Korea National Health Insurance Service. The SSNHL group (n = 154) included certain patients who were diagnosed with SSNHL between January 2003 and December 2005. The comparison group was selected using propensity score matching, according to sociodemographic factors and the year of enrollment. Each patient was monitored until 2013. Survival analysis, the log-rank test, and Cox proportional hazards regression models were used to calculate the incidence, survival rate, and hazard ratio of CCVD for each group.

Results:Among the 770 patients, 385 (50.0%) were female and 370 (48.1%) were aged between 45 and 64 years. Of the total study population, 66 patients developed CCVD, such as stroke and acutemyocardial infarction, during the 11-year follow-up period: 18 patients in the SSNHL group and 48 from the comparison group. After adjustment for other factors, the hazard ratio of CCVD during the 11-year follow-up period was 2.18 times greater for patients with SSNHL. An increased risk of stroke was associated with SSNHL ; however, there was no relation between SSNHL and risk of myocardial infarction.

Conclusions:This observational study using nationwide data suggests that SSNHL is associated with an increased incidence of CCVD, specifically stroke. Therefore, patient surveillance for signs of CCVD should be considered for patients who receive a diagnosis of SSNHL.

» **OTOP-32 15:00~15:10**

» Comparison of two different treatment protocols of systemic, intratympanic steroid and hyperbaric oxygen therapy in patients with severe to profound idiopathic sudden sensorineural hearing loss

¹Department of Otorhinolaryngology and Biomedical Research Institute, Pusan National University Hospital,

²Department of Otorhinolaryngology and Biomedical

Research Institute, Yangsan Pusan National University Hospital

Ilyoung CHO¹, Soo-Keun KONG¹, Sung-Won CHOI¹, Min-Sik KIM², Seuk-Hwan LEE¹, Hanseul NA¹, Se-Joon OH¹

Objectives:This study aimed to compare the efficacy of different treatment combination protocols in severe to profound sudden sensorineural hearing loss (ISSNHL) by randomized controlled trial.

Methods:A total of 100 patients diagnosed with severe to profound ISSNHL were randomly divided into two groups; an oral corticosteroid plus IT steroid plus HBO placebo (IT plus systemic combination group); and a combination therapy group plus HBO (two combination group). Hearing outcomes were determined by hearing gains in pure-tone average (PTA).

Results:The proportion of patients responding to therapy [response to treatment was calculated as gain of at least 10 dB in pure-tone average threshold] was the highest in the oral steroid + the intratympanic steroid + hyperbaric oxygen group with 93% (27/29) followed by the oral steroid + the intratympanic steroid group with 80% (24/30). The proportion of patients who had complete recovery [average of pure-tone hearing threshold: within 10 dB HL of the unaffected ear] was the highest in the oral steroid + the intratympanic steroid + hyperbaric oxygen group with 34% (10/29) followed by the oral steroid group with 26% (8/30). The oral steroid + the intratympanic steroid + hyperbaric oxygen group has the highest mean hearing gain 42 dB in pure-tone average among two groups. The hearing thresholds of each group were compared according to frequency, and the lower the frequency, the greater the hearing gain in both groups.

Conclusions:Idiopathic sudden sensorineural hearing loss patients receiving oral steroid + the intratympanic steroid + hyperbaric oxygen combination therapy have a higher likelihood of recovery than patients receiving oral steroids + the intratympanic steroid therapy.

» **OTOP-33 15:10~15:20**

» Vestibular function analysis of sudden sensorineural hearing loss with dizziness

Department of Otolaryngology-Head and Neck Surgery, Kangbuk Samsung Hospital, Sungkyunkwan University School of Medicine

Yong Woo LEE, Min-Beom KIM, Sun O CHANG, Jung Yup LEE, Jin Su PARK

Objectives:To analyze vestibular functions and to identify clinical characteristics of sudden sensorineural hearing loss(SSNHL) with dizziness

Methods:Total 262 patients of SSNHL from 2015.1 to 2017.12 were enrolled this study. Among them, 71 patients (27.1%) who complained of dizziness were investigated retrospectively. Those patients underwent vestibular function tests, consisted of video-nystagmography(VNG), video head impulse test(vHIT), vestibular evoked myogenic potentials(VEMP) to evaluate semicircular canal and otolith organ function.

Results:Among the 71 subjects, 35 subjects (49%) showed spontaneous nystagmus (SN) in VNG. Among them, 15(43%) patients had SN of ipsilesional direction, 17(49%) had SN of contralesional direction, 2(6%) had vertical SN. In vHIT analysis of 35 patients with SN, 20 (57%) showed ipsilesional posterior canal gain deficit. 11(31%) showed gain deficit in posterior canal only and 9 showed both horizontal and posterior canal gain deficit. Only 1 subject with bilateral horizontal canal gain deficit with vertical SN turned out to be AICA infarction. In 36 subjects without SN, 10 were diagnosed as BPPV, 5 had ipsilesional caloric canal paresis. Other 21 subjects showed no abnormal signs in vestibular function tests.

Conclusions:In VFT analysis of SSNHL with dizziness, diverse patterns were identified. In absence of SN, non-specific dizziness was most frequent. But in case with SN, posterior canal deficit was most common and acute vascular stroke was very rare. This seems to indicate that the pathophysiology of SSNHL is more likely to be

neurolabyrinthitis than vascular origin.

» **OTOP-34 15:20~15:30**

» Analysis of bilateral sudden sensorineural hearing loss for 10 years multi center, retrospective study of 29 patients

Department of Otorhinolaryngology-Head and Neck Surgery, Hallym University College of Medicine
Sung Kyun KIM, Seok Min HONG, Yong Bok KIM, Il Seok PARK, Heejin KIM

Objectives:Bilateral sudden sensorineural hearing loss is less common than unilateral, and its recovery rates are reported to be low even with immediate treatment. The purpose of this study was to analyze the audio-vestibular features of bilateral sudden hearing loss with vertigo during 10 years in 4 university hospitals.

Methods:This study analyzed the medical records of 29 patients who visited five university hospitals complaining of bilateral sudden hearing loss from 2008 to 2017. The changes of hearing threshold before and after treatment were compared by calculating the first and last PTA with the average of 6 frequency method. The vestibular function test was performed on the first visit. All patients underwent MRI for central lesion evaluation. Steroids were tapered after 5-7 days of prednisolone dosing at 1 mg / kg / day.

Results:Of the 29 patients, 22 had a history of apparent transient noise exposure before the onset of sudden hearing loss, and 17 had special events such as spinal anesthesia for delivery, initiation of chemotherapy, and extreme stress. 9 of 29 patients recovered from hearing, with complete recovery in 3 and partial recovery in 6. The mean time from symptom onset to treatment was 2.1 days, and the average time to hearing change was 5.4 days. 9 patients showed unilateral caloric weakness among 14 patients in vestibular function test. There were 6 patients with abnormal findings of brain parenchyma and internal auditory canal on MRI image [NF-2 (n = 2), bilateral cochlear nerve hypoplasia (n = 1), meningioma (n = 1), cerebellar infarct (n= 1), bilateral

intra-labyrinthine hemorrhage (n = 1)].

Conclusions: Unilateral bilateral sudden sensorineural hearing loss had a lower recovery rate than unilateral, and the incidence of vertigo and abnormal MRI findings were higher. In addition, there may be a specific personal event before the onset of the disease, so it is necessary to estimate the cause by detailed history taking at the time of the first visit in clinic.

OTOP VII

RM 2-4 (Swan)

Chair : Sung Won CHAE, Yang-Sun CHO

Best oral Presentation

» **OTOP-35 16:50~17:00**

» Correction of eyebrow depression by sub-brow, supra-brow incision, and endoscopic forehead lift in chronic facial palsy

*Department Of Otorhinolaryngology-Head And Neck
Surgery, Inje University College Of Medicine, Ilsan
Paik Hospital*

**Yong Seok JO, Hae Dong KIM, Byung Hyun
HAN, Jeon Mi LEE, Jin KIM**

Objectives: One of the most frequently observed facial change after facial palsy is forehead depression as well as eyelid ptosis. One-side depression of forehead and eyelid makes the patients to be embarrassed in their social life. The symmetric corrections of eyebrow and eyelid by sub-brow, supra-brow incision, and endoscopic forehead lift were compared in terms of cosmetic and functional purpose.

Methods: 102 patients were involved in this study from March 2014 to February 2018. All the patients had significant depression of eyebrow caused by chronic facial palsy. One of three surgical techniques were decided by their social life style, age, gender, and characteristics. The

evaluation was conducted by visual consultation at 3,6,12 months after surgery in terms of functional and cosmetic view.

Results: 8/10 patients were observed to have corrected eyebrow level after 1 year of endoscopic forehead lift without any surgical scar. 67/72 patients were also satisfied on disappearing scar and functional restoration after sub-brow incision, 13/20 patients were observed to have satisfied results after 1 year of supra-brow incision.

Conclusions: In terms of cosmetic purpose, eyebrow correction by endoscopic forehead lift without any surgical scar. It could be recommendable for young female patients. In terms of functional purpose, eyebrow correction using sub-brow incision was useful methods with little complications. High incidence of marked scar line and re-depression on eyebrow could be a disadvantage in supra-incision surgical technique.

» **OTOP-36 17:00~17:10**

» Functional MR Spectroscopy of the primary vestibular cortex in healthy subjects and patients with acute unilateral vestibular neuritis

*Department of Otorhinolaryngology - Head & Neck
Surgery, School of Medicine, Kyung-Hee University,
Seoul, Korea*

**Young Min HAH, MD, Young Seok BYUN,
MD, Sang Hoon KIM, MD, PhD, Seung
Geun YEO, MD, PhD, Moon Suh PARK,
MD, PhD, Jae Yong BYUN, MD, PhD**

Objectives: This study was designed to evaluate MR spectroscopic biochemical changes in patients with acute vestibular neuritis as compared with healthy volunteers. It is also designed to know metabolites concentrations changes and to evaluate the correlation between the grade of peripheral vestibular assessment and the concentration of metabolite in patients with Acute Unilateral VN.

Methods: This study included 33 individuals who visited Kyoung Hee medical center at Gang Dong from Mar.2016

to Mar.2017. We performed MR imaging and HMR 1 spectroscopy of the brain in VN patients. Single-voxel MR spectroscopy was used to study biochemical changes in the Primary vestibular cortex and cerebellum in 13 control subjects and 20 patients with acute VN.

Results: There are no significant alteration of all Brain metabolites between Acute unilateral VN group and normal control group. The mi/H₂O, mi/Cr ratio was lower in the primary vestibular cortex of lesion side when comparing those of contralesional side in acute VN patients. The NAA/Cr ratio was higher in the primary vestibular cortex of lesion side when comparing those of contralesional side in acute stage of acute VN patients. Correlation between Caloric CP and alteration of some metabolite concentration in VN patients at acute stage show the statistically significant. (Cho/Cr, Cho/H₂O, Cho/NAA, ml/Cr, ml/H₂O, NAA/Cr) There were no significant relationship between alteration of metabolite concentration and VEMP ratio, DHI score of acute VN patients

Conclusions: Myosinositol of lesion side was decreased and ratio of NAA to Cr was increased significantly when comparing those of contralesional side in acute VN patients. there are significant correlation between alteration of some brain metabolite like a myosinositol, cholin, ratio of NAA to cr and degree of canal paresis. so we could consider these metabolite would be biologic marker of acute VN.

» **OTOP-37 17:10~17:20**

» Hearing loss may induce tinnitus by strong auditory memory and increased vigilance - a qEEG study on hearing loss subjects with - and without tinnitus

¹Department of Otorhinolaryngology-Head and Neck Surgery, Seoul National University Bundang Hospital,

²Department of Otorhinolaryngology and Head and Neck Surgery, Chung-Ang University, ³School of Electronic and Electrical Engineering College of Information and Communication Engineering

Sungkyunkwan University

Jae-Jin SONG, Moon Young CHANG²,
Tae Sup MOON³

Objectives: In most cases, peripheral hearing loss (HL)-induced changes in the central auditory system is a prerequisite for the generation of subjective tinnitus. However, there are cases with considerable amount of HL without any development of tinnitus and this question on the differences between HL with our without tinnitus with regard to the cortical activity has never been addressed. In this regard, we compared resting-state quantitative electroencephalography (rs-qEEG) findings between the HL with tinnitus (HL-T) group and with no tinnitus (HL-NT) group to reveal cortical activity differences between the two.

Methods: Sixty-one HL-NT subjects were enrolled prospectively, and 61 HL-T subjects were selected from our database. The hearing thresholds were strictly matched between the two groups using support vector machine learning, and only subjects with low distress level (grade 1 or 2) were enrolled for the HL-T group. Rs-qEEG was measured in all included subjects and compared between the 2 groups with regard to source-localized activity and functional connectivity.

Results: As compared with the HL-NT group, the HL-T group showed increased activity in the parahippocampus (PHC) for the beta 2 and 3 frequency bands and in the inferior parietal lobule (IPL) for the gamma band. Also, the HL-NT group showed increased connectivity between the PHC and the auditory cortex (A1) as compared with the HL-T group.

Conclusions: Based on the current study, HL may induce tinnitus if the PHC-based auditory memory is strong enough to generate phantom auditory perception and the circuit-breaker activity of the IPL is high enough to make the subject with HL vigilant.

» **OTOP-38 17:20~17:30**

» Effect of round window simultaneous dexamethasone application with the application of aminoglycoside to oval window in intractable Menieres disease_Randomized prospective controlled study

¹Department of Otorhinolaryngology, Catholic University, Incheon St Marys Hospital, ²Department of Otorhinolaryngology, Inje University College of Medicine, Ilsan Baik Hospital, ³Department of Otorhinolaryngology, Yonsei University College of Medicine

**Hyun Jin LEE¹, Jeon Mi LEE², Ji Hyuk HAN³,
Sung Huhn KIM³**

Objectives:To investigate the effect of simultaneous application of dexamethasone to round window with the application of aminoglycoside to oval window for the treatment of intractable Meniere's disease.

Methods:The patients were randomly divided into two groups (n = 10 for each group). In one group, gentamicin or streptomycin was applied over the oval window after tympanomeatal flap elevation, and simultaneously, dexamethasone-soaked gel foam was applied to round window niche. In the other group normal saline-soaked gel foam was applied to round window niche instead of dexamethasone-soaked gel foam. Postoperative hearing and canal paresis changes, and improvement of vertigo attack number were compared between two groups. In addition, the results in this study were compared with those in the patients with the application of aminoglycoside to round window niche (n=98).

Results:In the whole study population, hearing threshold were not significantly changed at 1 month (from 42 to 48dB, $p>0.05$). CP value were significantly increased from 42 to 52% ($p=0.03$) postoperatively. The number of vertigo spell was improved significantly (from 12 to 1.5/6 months. $p=0.02$). Those results were similarly observed in the two study groups. However, differences in the postoperative

changes in hearing threshold, CP value, and number of vertigo attacks between the two group were not significantly different ($P>0.05$). The results of hearing preservation, vestibular function deterioration, and vertigo control were not different between the application of aminoglycoside at oval window and round window area ($P>0.05$).

Conclusions:Simultaneous local application of dexamethasone with intratympanic gentamicin or streptomycin does not have any effect in preserving hearing and improving prognosis. The location of the aminoglycoside application (oval window or round window) is not so important for better treatment outcome.

» **OTOP-39 17:30~17:40**

» Effects of space perception on vestibular loss mice

¹Department of Otorhinolaryngology, Catholic Kwandong University International ST Marys Hospital, ²Department of Otolaryngology-Head and Neck Surgery, Gachon University of Medicine and Science, Graduate School of Medicine

**Mi Joo KIM¹, Jiyeon LEE¹, Miseon AN¹, Gyu
cheol HAN²**

Objectives:Space perception and direction of locomotion are based on direction & place cell and short term memory of hippocampus. All information regulated in the hippocampus is based on visual input and vestibular information. Therefore, the change of the vestibular function causes distortion of the object's space perception and decision of locomotion. To demonstrate this, a behavioral test using Y-Maze was performed on semicircular canal and otolithic organ destroyed animal models.

Methods:The Y-maze test was performed by dividing the otolithic organ function changing group (n = 10) and a labyrinthectomy group (n = 10, POD #3). The information obtained from the Maze test was coded as the order of selection from each arm to the other of maze, and finally the dominancy of left-right side was calculated as %.

Results:The otolithic function changing group had no dominance of the left-right side regardless of centrifuge direction ($p > 0.05$), and the locomotion selection dominance was observed in the labyrinthectomy group toward the vestibular loss.

Conclusions:In the Hippocampus, space-related information processing seems to be determined by semicircular canal information rather than otolithic organ.

» **OTOP-40 17:40~17:50**

» **Outcomes of insurance-covered targeted sequencing for diagnosis of genetic hearing loss in Korea**

¹Department of Otorhinolaryngology, Yonsei University College of Medicine, ²Department of Pharmacology, Yonsei University College of Medicine
Jinsei JUNG¹, John RIM², Heon Yung GEE², Jae Young CHOI¹

Objectives:Recently, next generation sequencing (NGS) for genetic diseases has been covered by public insurance in Korea. Although genetic hearing loss is extremely heterogeneous, NGS panel sequencing for genetic hearing loss has been approved. Herein, we performed custom panel targeted sequencing for genetic hearing loss and analyzed in the perspective of medical diagnosis.

Methods:We designed targeted gene panels for next generation sequencing to identify genomic variations responsible for genetic hearing loss. It included 104 genes for non-syndromic hearing loss and 78 genes for syndromic hearing loss, which were highly selected based on the literatures and databases. MiSeq system, BaseSpace, and Next GENE were used for sequencing, analysis, and quality control. SNV, CNV, and structural variation were analyzed with our custom analysis pipeline.

Results:Twenty-eight patients who were suspicious for nonsyndromic inherited hearing loss without mutations in SLC26A4 and GJB2 were enrolled. Of 28 patients, 19 had postlingual hearing loss and 9 had prelingual hearing

loss. Twelve patients were multiplex, while 16 patients were simplex. Eighteen patients were mild to moderate hearing loss, while 10 patients were severe to profound hearing loss. Among 28 total subjects, 6 patients (21.4%) were diagnosed as pathologic or likely pathologic. Among 12 of multiplex subjects, 5 patients (41.7%) were genetically diagnosed. The confirmed mutations were located in the genes of STRC, NLRP3, KCNQ4, POU4F3, POU3F4, and TECTA. Notably, there are even more possible candidate mutations in the genes such as COL11A1, COL11A2, MYH14, TECTA. However, these mutations did not reach to the level of diagnosis due to the lack of evidence.

Conclusions:While the possible candidate mutations for genetic hearing loss would be more identified and suggested than the final reported mutations, genetic diagnosis should be more strictly and conservatively performed according to the AGCM guideline.

Resident Paper Award

RM 3-1 (Emerald A)
Chair : Kyu Sung KIM, So Young PARK
Resident Paper Award

» **OTOP-14 11:00~11:10**

» Changes of cochlea glucocorticoid receptor and serum corticosterone in noise induced hearing loss animal model a comparison of administration time of dexamethasone

¹Department of Otolaryngology-Head and Neck Surgery, College of Medicine, Chungnam National University, Daejeon, Korea, ²Department of Medical Science, College of Medicine, Chungnam National University, Daejeon, Korea

Seung Hun Lee¹, Sun-Ae Shin^{1,2}, Ah-Ra Lyu^{1,2}, Yong-Ho Park¹

Objectives: Glucocorticoids are hormones secreted from the adrenal cortex in response to stress and are used for the treatment of various inner ear diseases. It is mainly present in rodents as a corticosterone and acts by binding to the glucocorticoid receptor (GR). The purpose of this study was to investigate the changes in cochlear GR and serum corticosterone levels following noise exposure. In addition, we aimed to investigate the effect of dexamethasone (DEX) when administered at different time points.

Methods: Seventy-five CBA/J mice were used for this study. Animals were divided into two groups according to the noise exposure level (transient threshold shift group (TTS), permanent threshold shift group (PTS)). Changes in auditory brainstem response (ABR) thresholds were measured, and the changes in gene expression of GR mRNA and inflammatory cytokines were evaluated using real time polymerase chain reaction (qRT-PCR). Serum corticosterone was evaluated by enzyme-linked immunosorbent assay (ELISA). Changes in the cochlea hair

cells were observed using immunohistochemical staining. DEX was administered before, after, and before and after the noise exposure.

Results: The expression of GR gene was significantly decreased after noise exposure, and the serum corticosterone levels and inflammatory cytokines were increased. On DEX administration, GR mRNA expression was further decreased in the TTS group, but not in the PTS group. Serum corticosterone levels and inflammatory cytokines were significantly decreased when DEX was administered before and after exposure to noise. The hair cells of the TTS group were almost preserved, but the PTS group was mostly destroyed.

Conclusions: Serum corticosterone level and GR expression are important for maintaining cochlear homeostasis and DEX administration before acoustic trauma seems to be more appropriate to prevent noise induced hearing loss.

RHKL I

RM 4-2 (Convention B)
Chair : Chul Hee LEE

Keynote Lecture

» 10:30~11:00

» Physician wellness

Eastern Virginia Medical School

Joseph HAN

This presentation will address the mental and physical well being of a physician in current demanding US medical environment. The awareness and characteristics of physician burnout will be examined as well as the various causes for physician fatigue in the US. The impact of physician burnout on patient care in the US will be discussed. Possible preventative measure and resilience techniques to minimize burnout will be presented, so that a well-balanced work-life approach can be maintained.

several randomized controlled studies of sublingual immunotherapy (SLIT) for allergic rhinitis were conducted on a large scale in Japan and showed that SLIT was effective and safe. One of the studies was conducted over 52 weeks using the house dust mite (HDM) allergen tablets and a total of 968 patients with house dust mite induced allergic rhinitis participated in it. This study showed that the SLIT was effective and safe in both mono and poly-sensitized patients with HDM allergic rhinitis, regardless of co-sensitization status. We also compared the baseline characteristics among the patients, such as sex, age, body weight, levels of mite specific IgE, and number of eosinophils in blood in this study, however a significant difference was not observed in the efficacy. We analyzed HDM-reactive Th2 cell subsets in the peripheral blood of the patients who participated in this study, and found that HDM-reactive ST2+Th2 cells significantly decreased after SLIT and were lower in the responders of the active group than those in the non-responders. Therefore, allergen-reactive ST2+Th2 cells may be useful as markers indicating the successful treatment of SLIT.

April 28(Sat)
RHKL

RHKL II

RM 4-2 (Convention B)
Chair : Jin Hee CHO

Keynote Lecture

» 13:30~14:00

» Immunotherapy up-to-date for allergic rhinitis

*Dept. of Otorhinolaryngology, Head and Neck Surgery,
Graduate School of Medicine, Chiba University*

Yoshitaka OKAMOTO

Allergen-specific immunotherapy is effective for changing the natural course of allergic rhinitis. Recently,

RHSP I

RM 4-2 (Convention B)

Chair : Do-Yeon CHO, Seong H. CHO

Immunity and Pathogenesis of CRS/NP

» 11:00~11:15

» Role of superantigens in CRS

*Department of Otorhinolaryngology-Head and Neck
Surgery, Korea University College of Medicine*

Tae Hoon KIM

Superantigens (SAGs) are a class of antigens that cause non-specific activation of T-cells resulting in polyclonal T cell activation and massive cytokine release. SAG was first described in 1989 in reference to the activation of T lymphocytes by the staphylococcal enterotoxin B. Since then, many other proteins with SAGs, which act as superallergens by stimulating mast cells and basophils with a wide range of immunoglobulin E specificities, have been observed. In addition, a group of SAG-like proteins, which have multiple effects on the innate immunity, have been recently described. In the present presentation, I'd like to explain and summarize the current knowledge of SAGs and their role in CRS.

» 11:15~11:35

» Mucociliary dysfunction in the pathogenesis of chronic rhinosinusitis

*Dep. of Otolaryngology, Univ. of Alabama at
Birmingham*

Do-Yeon CHO

The upper and lower airways are constantly exposed to environmental insults in the form of inhaled ambient pathogens, allergens, and other particulate matter. Mucociliary clearance (MCC) is the primary innate

defense mechanism by which inhaled particulate matter is eliminated from the airways. Proper functioning of MCC relies on two equally important constituents: mucus production and mucus transport, both of which are contingent upon normal ciliary beating, adequate hydration of airway surface liquid (ASL), periciliary liquid (PCL), and mucus viscosity. Abnormalities in any one of these critical components may result in dysfunctional MCC, irrespective of the underlying etiology. Impaired MCC is a key finding in many airway diseases, including chronic obstructive pulmonary disease and chronic rhinosinusitis (CRS). In patients with CRS, for example, dysfunctional MCC predisposes the upper airways to a perpetuating cycle of obstruction and infection, with a consequent decrease in overall quality of life (QOL). There is a relative paucity of methods currently used for quantitatively assessing MCC, particularly in the upper airways. As a result, our ability to fully comprehend early pathogenesis of CRS has been severely limited. However, there have been many studies and a variety of methods for assessing MCC when evaluating lower air-way pathology, especially CF airways with thick abundant mucus (a hallmark of inflamed and/or infected sinuses). In this presentation, differences in mucus strand velocities in patients with CRS as compared to normal and the pathophysiology of impaired MCC will be discussed. Using a multiphoton confocal microscope, we were able to visualize the dynamic mucus strands and our experiments demonstrated that mucus strand velocity was significantly decreased in CRS patients when compared to normal controls.

» 11:35~11:50

» ILC subsets in asian nasal polyps

*Department of Otorhinolaryngology-Head and Neck
Surgery, Seoul National University College of Medicine*

Dong-Young KIM

Chronic rhinosinusitis with nasal polyp (CRSwNP) is an umbrella term for a heterogeneous group of inflammatory

disorders characterized by persistent polypoid inflammation of the sinonasal mucosa (>12 weeks). There is a regional variation in CRSwNP endotypes: Western polyp shows a predominance of eosinophilic TH2-inflammation, whereas Asian polyp has a predominant neutrophilic infiltration and a local TH1/TH17 signature. Innate lymphoid cell (ILC) is a group of innate immune cells that belong to the lymphoid lineage, but do not respond in an antigen-specific manner, as they lack a B or T cell receptor. ILCs have been shown to regulate defense against infection, adaptive immunity and wound healing through their prompt reactivity to tissue infection and injury. ILCs can be categorized according to their cytokine secretion. It mirrors the phenotypes and function of CD4+ T helper cells. CRSwNP and eosinophilic CRS have been linked with a skewed Th2 immune response through eosinophilic inflammation mainly mediated through IL-5 and IL-13 cytokines. The discovery of ILC2s, which promote Th2 inflammation, represents an important finding in immunology and highlights a potential role within CRS. It was reported that the frequency of ILC2s were 2.23 times enriched in western nasal polyps compare to controls. However, the study on ILC subsets in Asian nasal polyps is still lacking. We aimed to analyze ILC subsets in CRS tissue across different phenotypes (CRSwNP / CRSsNP) and endotypes (eosinophilic CRS / non-eosinophilic CRS) in Asian patients, and correlation between clinical characteristics such as serum total IgE, blood eosinophils, and CT score and the frequency of ILC subsets. The effect of allergic rhinitis (AR) on ILC subsets in NP tissue was also evaluated. Samples were collected from both uncinate tissue and nasal polyps of patients with CRSwNP, and from uncinate tissue of patients with CRS without nasal polyp (CRSsNP) and normal control. Single cell suspension was achieved, and then ILC subtypes were analyzed using flow cytometry. Real-time PCR was performed to analyze the mRNA expression levels of major ILC-activating cytokines. Sixty percent of CRSwNP patients had eosinophilic NP, while most uncinate tissues of CRSsNP were non-eosinophilic (93.7%). ILC2 frequency was significantly

higher in NP and eosinophilic CRS (ECRS). NCR (natural cytotoxicity receptor)- ILC3 was also increased in NP and ECRS. IL-22-producing ILC3s were elevated in NP of CRSwNP. ILC percentage was not significantly correlated with serum total IgE, blood eosinophil count, and Lund-Mackay CT score. Allergic rhinitis increased ILC2 in NP tissues, but not NCR- ILC3. Therefore, NCR- ILC3s as well as ILC2s may contribute to the pathogenesis of nasal polyp in Asian CRSwNP patients.

» 11:50~12:05

» The role of epithelium on pathophysiology of rhinosinusitis

Yonsei University Severance Hospital
Chang-Hoon KIM

The airway epithelium is the first place to perform a defense mechanism against environmental stimuli. Therefore, its role in the innate immunity is essential by mechanical barrier and mucociliary transport. To maintain this normal physiologic function, normal oxygenation is critical to produce energy for optimal cellular function. Several pathologic conditions are associated with a decrease of oxygen tension in airway epithelium and chronic sinusitis is one of airway diseases which are associated with hypoxic condition, a potent inflammatory stimulant. We have seen the overexpression of the hypoxia-inducible factor 1 (HIF-1), an essential factor for oxygen homeostasis, in the epithelium of sinus mucosa from sinusitis patients. In the series of previous reports, we have found that hypoxia induced mucus hyperproduction, especially by MUC5AC hyperproduction, disruption of epithelial barrier function by production of VEGF and down regulation of junctional proteins such as ZO-1 and E-cadherin. Furthermore, hypoxia induced inflammation by HMGB1 translocation to cytoplasm result in release of IL-8 through ROS-dependent mechanism in upper airway epithelium. In this mini review, we briefly introduce and summarize current progress in the pathogenesis of sinusitis related to hypoxia.

The investigation of hypoxia-related pathophysiology in airway epithelium will suggest new insights on airway inflammatory diseases, such as rhinosinusitis for the clinical application and drug development.

» 12:05-12:25

» CRS phenotypes an approach to better medical care for CRS

Div of Allergy-Immunology, Univ. of South Florida

Seong H. CHO

Chronic rhinosinusitis (CRS) is a heterogeneous inflammatory disease with various underlying pathophysiologic mechanisms. CRS is traditionally divided by clinical phenotypes such as CRS with nasal polyps (NP; CRSwNP) or CRS without NP (CRSsNP) and sub-classified further by histologic subtypes such as eosinophilic or neutrophilic. Recently endotyping CRS by its pathophysiologic mechanisms is becoming increasingly crucial by emerging development and clinical application of biologic agents. Defining endotypes can assist clinicians to predict disease prognosis, make a decision for specific therapy, and assess risks for comorbid conditions, including asthma. Therefore, with recent advancement of biologicals in CRS clinical trials, proper endotyping can be a breakthrough in treating recalcitrant CRS. CRS is caused by dysregulated immunologic responses to external stimuli, which induce various inflammatory mediators from inflammatory cells, including innate lymphoid cells (ILCs) and T lymphocytes as well as epithelial cells. Thymic stromal lymphopoietin (TSLP), interleukin (IL)-25, and IL-33, which are mainly secreted by epithelial cells in response to external stimuli, act on type 2 ILCs and T helper 2 (Th2) cells, inducing IL-4, IL-5, and IL-13. Local immunoglobulin E (IgE) production, eosinophilic infiltration, and tissue remodeling follow as consequence of the immune dysregulation, especially in NP. Understanding these phenotypes and endotypes of individual recalcitrant CRS patients would lead to successful personalized management.

RHSP II

RM 4-2 (Convention B)

Chair : Jin Hee CHO, Kornkiat SNIDVONGS

Challenges in Frontal Sinus Surgery

» 14:00~14:15

» Basics of frontal sinus surgery

Seoul National University Hospital

Doo Hee HAN

Frontal sinus surgery is the most challenging part among the endoscopic sinus surgery. Having a clear idea of the frontal recess anatomy is mandatory so to perform sophisticated surgical procedures. The frontal recess is an hourglass-shaped space. The anterior border of frontal recess is agger nasi cell (ANC) and frontal beak. Its posterior border is skull base, bulla ethmoidalis and bulla lamella. Also, medial border is the cribriform plate and middle turbinate. Lateral border is lamina papyracea. ANC and uncinate process (UP) are key structures to understand the frontal recess anatomy. The four types of frontal cells, supraorbital, suprabullar, frontal bulla and interfrontal sinus septal cells are also important landmarks in frontal sinusotomy. In addition, image-guided navigation system can be helpful for difficult or revision cases. In this topic, the frontal recess anatomy and various frontal recess cells will be introduced. Through the complete understanding of frontal recess anatomy and thorough review of the preoperative CT scan, we can achieve safe and effective frontal sinusotomy.

» 14:15~14:30

» Pitfalls and tips for frontal sinusotomy

*Department of Otorhinolaryngology-Head and Neck
Surgery, Chungnam National University School of
Medicine*
Yong Min KIM

Frontal sinusotomy has been considered as a challenging and the most difficult procedure in functional endoscopic sinus surgery. The reasons why this procedure is difficult is mainly attributed to its variable and complex anatomy, extent of disease, and postoperative scarring and osteoneogenesis. To achieve successful result, it is crucial to maintain an adequate frontal sinus opening while preserving mucosa around the frontal recess. This can be achieved by doing a stepwise approach while identifying critical endoscopic anatomic landmarks, and using of correct surgical instruments. In this session, the author will present the useful anatomic landmarks and tips to achieve safe frontal sinusotomy.

» 14:30~14:50

» Endoscopic modified lothrop procedure outside in versus inside out

*Dep. of Otolaryngology, Faculty of Medicine,
Chulalongkorn Univ.*
Kornkiat SNIDVONGS

Drilling in Inside out approach of Endoscopic Modified Lothrop Procedure (MELP) is traditionally described as commencing from the frontal recess (FR). This is challenging when the FR is involved by tumor, inflammatory disease, or scarring. The outside in MELP, where the limits of the sinusotomy are first defined and the FR is addressed last, has been described and published by David Chin, Kornkiat Snidvongs, Larry Kalish, Raymond Sacks and Richard Harvey. Thirty patients (67% female) underwent MELP (24 outside-in, 6 inside-out)

for inflammatory disease or endoscopic skull base surgery were assessed. Time for Lothrop completion was shorter for outside-in MELP (30.60 ± 14.10 minutes vs. 69.66 ± 64.52 minutes, $P = 0.002$). Among outside-in MELP, mean time to frontal sinus floor discovery was 8.41 ± 6.29 minutes, to recess connected 26.50 ± 12.45 minutes, and were similar regardless of pathology. The outside-in MELP is technically feasible and safe. Its advantage is a wide approach to the frontal sinus with development of the Lothrop cavity en route resulting in short predictable operative times. Defining the limits of the dissection early provides a robust and efficient approach.

» 14:50~15:05

» When & how to do external approaches to frontal sinus

*Department of Otorhinolaryngology-Head and Neck
Surgery, Konkuk University School of Medicine*
Jin Kook KIM

The recent advances in endoscopic visualization and instrumentation have significantly decreased the need for external approaches to the frontal sinus. Nonetheless, in cases of recalcitrant chronic frontal sinusitis, these external procedures can still be used alone or in conjunction with endoscopic endonasal frontal sinus approaches. These external approaches include the frontal sinus trephination, the external frontoethmoidectomy, and frontal sinus osteoplastic flap with or without obliteration. Indications for these procedures include disease involving the far lateral region of the frontal sinus, disease in a type 4 (intrasinus) frontal cell, osteomyelitis, and previous trauma. The aim of this lecture was to review when and how to do external approaches to frontal sinus.

» 15:05~15:25

» Complications of frontal sinus surgery and its management

*Division of Head and Neck Surgery, Department of
Surgery, Duke University*

David W JANG

Endoscopic frontal sinus surgery can be challenging due to anatomic variations and technical difficulty. In addition, serious complications can occur. This talk will focus on complications and their management. The most common complication is trauma to the frontal ostium, leading to frontal stenosis. This is typically managed through extended frontal sinusotomy techniques, although balloon dilation technology has recently played a role. Other complications involve injury to adjacent structures, including the anterior ethmoidal artery (AEA), anterior skull base (ASB), and lamina papyracea (LP). Injury to the AEA can lead to orbital hematoma, which must be decompressed emergently. Injury to the ASB, if minor, can often be repaired immediately with minimal morbidity. However, major injury can lead to severe neurologic sequelae. Finally, injury to the LP is also managed conservatively if there is a minor breach. Major injury can lead to severe ophthalmologic sequelae.

RHSP III

RM 3-2 (Emerald B)

Chair : Jae Goo KANG, Chuan Hsiang Steve KAO

Tips and Pearls of Augmentation Rhinoplasty

» 15:50~16:10

» What materials do you choose for augmentation?

*Dept. ORL-HNS of Kyung Hee Univ. hospital at
Gangdong*

Kun Hee LEE

Each grafting material has unique chemical, physical and biologic properties. The choice of the implant and graft used during rhinoplasty remains an area of continuous debate and controversy. The surgeon should understand the benefits and limitations of each grafting material. Grafts are classified based on the source from which they are derived. Nonsynthetic ones include autografts and homografts. Autografts are obtained from the patient and include cartilage, bone, fascia, and dermis. Homografts are derived from tissues donated by members of the same species and include irradiated cartilage, acellular dermis, and fascia lata. Other options include alloplastic implants, which are synthetic biocompatible polymers with a variety of applications in plastic surgery. Autologous grafts have relatively high biocompatibility and low risk of infection and extrusion as compared with homografts and alloplastic implants. But donor site morbidity, graft availability, and graft resorption have led to the consideration of homologous and allogenic implants in various secondary rhinoplasty scenarios. The clinical judgment remains the most important determinant in selecting the appropriate type, size, and shape of graft used to correct nasal deformities in revision rhinoplasty. Each material offers advantages that may be necessary based on the clinical scenario and nature of the revision, augmentation, or reconstruction. Similarly, each graft type may have disadvantages that preclude its use in different cases. It is important for the rhinoplastic surgeon to be aware of such advantages and disadvantages and the appropriate techniques needed to overcome some of the limitations of the grafting method so that the optimal aesthetic and reconstructive result is achieved.

» 16:10-16:30

» Talor-made dorsal augmentation using silicone

Tri-Service General Hospital
Chuan Hsiang Steve KAO

Various materials, both biologic and alloplastic, have been used for nasal augmentation. In Asian countries, artificial silastic silicone implants have been used in augmentation rhinoplasty with acceptable satisfactory rate for many years. Although biologic grafts (fascia, dermis, cartilage..) were used for rhinoplasty with less infection rates, they are also associated with long-term resorption, warping, and donor-site morbidity. The alloplastic material, I or L-shaped silicone, has risks of migration, extrusion, capsule formation, and infection but have the advantages of simplicity and easy to reshape. We will present the methods to minimize the complications from silicone implantation. The first is to select good candidates who need mild to moderate augmentation of nose, and without previous nasal surgery or infection. Second, select a silicone implant with optimal shape, length and size which can be carved to fix the nasal dorsal in sub-periosteum. Third, surgeons with well open rhinoplasty experience who can apply caudal extension grafting to reinforce the tip support, and harvest cartilage for tip grafting if necessary. In summary, silicone implantation for nasal augmentation can be a safe and effective procedure in Asian patient when used for mild to moderate augmentation.

» 16:30-16:50

» Long term results of rhinoplasty using diced cartilage

Department of Otolaryngology, University of Ulsan
College of Medicine
Yong Ju JANG

Various implants and grafts are used for dorsal augmentation in rhinoplasty. Autologous cartilage grafts in the

form of diced or crushed cartilage are one of the useful option in shaping desirable dorsal line. Diced or crushed cartilage grafts can avoid warping or unnatural-looking graft showing of the nasal dorsum, however resorption and contour irregularity can be common complication of those cartilages. In this lecture, authors experience on the the long term results of different forms of cartilage implants will be presented. In addition, long term results of other dorsal implant material will also be presented to provide a better understanding on the characteristics of different dorsal augmentation materials.

» 16:50-17:10

» Pros and cons of using rib cartilage

Dr Jins Premium Nose Clinic
Hong-Ryul JIN

Using rib cartilage for dorsal augmentation is a tricky task even for experienced surgeons. It has many pitfalls to avoid and needs experience and efforts to successfully master the work. Although rib cartilage provides many advantages compared to alloplastic material, using rib cartilage has been highlighted in terms of its side effects and disadvantages. In this lecture, authors would like to focus on how to avoid possible pitfalls in using rib cartilage rather than emphasizing the well-known advantages. Briefly mentioning the advantages, autogenous rib provides ample amount of cartilage to cover major dorsal augmentation. It is safe in terms of foreign body reaction and is also resistant to infection. It can be used to replace or reconstruct the deformed septum and to shape the tip also. Perichondrium from the rib surface provides additional camouflage to the tip or damaged skin. Disadvantages include warping, displacement, infection, and donor site morbidity which includes scar, pain, and pneumothorax. The incision performed at the inframammary crease in female patients gives camouflage and the incision length can be reduced as short as 1.0 cm in thin skinned patients. Chest pain is minimized by not incising rectus muscle

horizontally but splitting vertically and retracting to secure vision. Pneumothorax is prevented by preserving the posterior perichondrium during the dissection. Warping is minimized by carving the precise central core of the rib cartilage and immersing the cartilage in warm saline for 30 minutes to confirm an accurate shape. Secure fixation of the carved rib to the dorsum also helps to minimize warping. Minimal warping at the radix is treated with 18-G needle shaving at the outpatient clinic. A strip of perichondrium from the rib is used to camouflage graft borders and to immobilize the graft to the rasped radix. In conclusion, although rib cartilage is a great graft material for dorsal augmentation, distinct disadvantages need major attention. Judicious application minimizes possible complications and maximizes the advantages of using autogenous material.

RHOP I

RM 3-2 (Emerald B)

Chair : **Mohammed Hussein AHMED**
Sam-Hyun KWON

Rhinosinusitis I

» **RHOP-01 08:00~08:10**

» Our experience with rhinolaryngoscleroma & its atypical presentations in egypt

¹Otorhinolaryngology Dep. Faculty of Medicine

Fayoum Univ., ²Cairo Univ., Egypt

Mohammed Ahmed Hussein AHMED¹, Osama HASSAN², Ahmed Mahmoud ELBATAWY²

Objectives:To show our experience with Rhinolaryngoscleroma (being endemic in Egypt) with its atypical presentations

Methods:This is a retrospective case series description of nine cases with atypical presentation of respiratory scleroma. We reviewed medical documents of cases, who were surprisingly diagnosed with scleroma. It was done in two institutes :Fayoum University hospitals & Cairo University hospitals Cases presented in the last four years from 2013 to 2017 We included in this study nine cases in whom the presentation was not the typical presentation and the diagnosis was confirmed by histopathological examination.

Results:1) Isolated Tracheal Granulations 26 years old female patient 2) Supraglottic swelling (2 Cases) 33&45 female patients 3) Isolated nasopharyngeal stenosis 40 yrs old male patient 4) isolated nasopharyngeal mass 60 yrs. old male patient presented by bilateral secretory otitis media 5) bilateral maxillary polyps 45 yrs. old female patient 6) Unilateral nasal mass 36 yrs. old female patient 7) bilateral septal swelling 35 yrs. old female patient 8) extensive sinonasal scleroma with supra glottic and soft palate involvement

Conclusions:Rhinolaryngoscleroma (being endemic in

Egypt) is the commonest granuloma and should be put in mind in differential diagnosis of large variety of clinical problems facing otorhinolaryngologists.

» **RHOP-02 08:10~08:20**

» **Presentation and management of orbital complications following sinusitis a 15-year experience in severance**

¹Department of Otorhinolaryngology, Yonsei University College of Medicine, Seoul, Korea, ²The Airway Mucus Institute, Yonsei University College of Medicine, Severance Hospital, Seoul, South Korea, ³Korea Mouse Sensory Phenotyping Center, ⁴Global Research Laboratory for Allergic Airway Diseases, ⁵Medical Research Center, Yonsei University College of Medicine, ⁶The Centre for Personalised Medicine and Division of Pediatrics, Department of Clinical and Experimental Medicine, Linköping University, Sweden
Sang Hyeon AHN¹, Hyung-Ju CHO^{1, 2, 3}, Joo-Heon YOON^{1, 2, 3, 4}, Chang-Hoon KIM^{1, 2, 3, 5}, Eun Jung LEE^{1, 6}

Objectives: Sinusitis can be complicated by the formation of orbital cellulitis or abscess which poses a serious threat to patient's vision and it can lead to irreversible damage if not treated aggressively. We aimed to evaluate the severity of sinusitis according to Chandler classification, relation with systemic inflammation, and different treatment outcomes of orbital complications following sinusitis.

Methods: A fifteen-year retrospective review of forty-three admitted to our institution with the diagnosis of the orbital complication of sinus infections was carried out. Sex, age, medical history, previous operation history, laboratory findings, imaging findings, treatment methods, and treatment outcomes were analyzed by Chandler classification.

Results: Forty-three patients had stage I (preseptal cellulitis, n = 12 patients), II (orbital cellulitis, n = 10), III (subperiosteal abscess, n = 10), IV (orbital abscess, n =

8), or V (intracranial involvement, n = 3) complications. The Lund-Mackay score showing the severity of sinusitis and the staging of orbital complication were positively correlated (r= 0.486, p = 0.01). PLR as a biomarker of systemic inflammation showed an increasing tendency with the staging of orbital complication (r=0.327, p=0.032).
Conclusions: Although Chandler's classification system does not necessarily imply an order of disease progression, we concluded that Chandler's classification can reflect the severity of sinusitis requiring emergent surgical treatment and the degree of systemic inflammation. Therefore, it is important to identify Chandler's staging and the exact type of orbital complication using CT evaluation before treatment.

» **RHOP-03 08:20~08:30**

» **Predict postoperative subjective outcomes in patients with chronic rhinosinusitis using cluster analysis**

Department of Otorhinolaryngology-Head and Neck Surgery, Samsung Medical Center, Sungkyunkwan University School of Medicine
Gwanghui RYU, Jung Joo LEE, Sang Duk HONG, Hyo Yeol KIM, Seung-Kyu CHUNG, Hun-Jong DHONG

Objectives: Numerous studies have focused on the phenotype of chronic rhinosinusitis (CRS) using cluster analysis. Although there are no studies that predicting postoperative outcomes using this methods. The aims of study was to identify phenotype of CRS and to evaluate postoperative outcomes using clustering and algorithm classifier.

Methods: 397 patients who underwent a functional endoscopic sinus surgery (FESS) were enrolled and their clinical data were evaluated. Postoperative outcomes were assessed with SNOT-22 in 1/3/6 months after FESS. Ward's hierarchical method was used to perform the cluster analysis. Discriminant analysis was performed using

random forest classifier. Four clusters were chosen and 98% of individuals were categorized in to the appropriate cluster using random forest classifier. Variables that used classify the algorithm were presence of nasal polyp (NP), asthma, gender, atopy, smoking, and revision surgery.

Results: Each cluster showed different characteristics. Cluster 1 was mainly CRS without NP (99%), non-asthmatic (98%) and the highest psychological symptoms in SNOT-22 subdomain. Cluster 2 was all male patients, all atopic, NP (99%) and smoker (51%) groups. Cluster 3 was female (86%), asthmatic (35%), NP (95%) and cluster 4 was all male, all NP, and revision (44%) cases. Cluster 1 and 3 had persistent symptoms after surgery though disease severity (LM score) was lower than other clusters. Cluster 2 and 4 showed gradual improvement during follow-up periods.

Conclusions: CRS without NP with non-asthmatic patients and asthmatic female with NP patients showed poor subjective outcomes after FESS. These phenotypes of CRS patients need more careful preoperative counseling and deciding surgery discreetly.

» **RHOP-04 08:30~08:40**

» Incidence and radiologic findings of incidental sinusitis in patients undergoing septoplasty or rhinoplasty

¹Department of Otolaryngology, National Medical Center, Seoul, Korea, ²Department of Otolaryngology, Asan Medical Center, College of Medicine, University of Ulsan, Seoul, Korea

Sung Hee KIM, MD¹, Yong Ju JANG, MD, PhD²

Objectives: Although there is controversy in its routine use - in order to detect hidden sinus pathology or for better evaluation of septal and bony deformity - CT scan is employed in preoperative screening for the patients who are planned for septoplasty or rhinoplasty. The aim of this study is to evaluate the incidence and radiological characteristics of incidentally found sinus pathology on

screening CT scan in patients who underwent elective septoplasty or rhinoplasty.

Methods: We retrospectively reviewed the patients who underwent septoplasty and rhinoplasty by a single surgeon (Y.J.J.) in Asan Medical Center between January 2016 and December 2017. A total of 541 patients (144 women) with a mean age of 34.8 years (range, 14-72) agreed upon taking preoperative CT scan. Based on the endoscopic examination and history taking, 24 patients who were suspicious of having sinusitis were excluded from the study group. CT scans were reviewed to find the location and extent of the incidental sinusitis.

Results: Of the 517 patients, 23 (4.6%) patients showed asymptomatic sinusitis on CT findings. There were 22 men and 1 woman with a median age of 34 (20-53) years old. The mean Lund-Mackey (LM) score was 4.4 and 65% (15/23) of them had mild sinusitis with LM score below 4. Seventy-eight percent (18/23) of the patients showed an involvement of ethmoid sinus, 70% (16/23) of the maxillary, 22% (5/23) of the frontal, 17.4% (4/23) of the sphenoid sinus. Twenty-six percent (6/23) of the patients had a single sinus involvement of posterior ethmoid or maxillary sinusitis. Conclusions: In patients undergoing septoplasty or rhinoplasty, the incidence of asymptomatic sinusitis was approximately 5%, and the most frequently involved was ethmoid sinus. The results of this study indicate that the preoperative CT scan in patients undergoing septoplasty or rhinoplasty is useful not only for better understanding the anatomical detail but also for detecting hidden paranasal sinus disease.

» **RHOP-05 08:40~08:50**

» Adenoidectomy may not be effective to reduce the number of hospital visits for sinusitis: national cohort study

Department of Otorhinolaryngology-Head and Neck Surgery, Bundang CHA Medical Center, CHA University

Mi-Kyung KIM, Tae-Hyun SHIN, Cheong-Se

WON, Min-Su KIM

Objectives:The objective of this study was to compare post-operative visits for sinusitis between adenoidectomy and non-adenoidectomy participants (control).

Methods:Using the national cohort study from the Korean Health Insurance Review and Assessment Service, we used 1:4 matching to select 2,593 adenoidectomy participants and 10,372 control participants. Post-operative visits for sinusitis were measured from post-op 1 year through post-op 9 year. Equivalence testing was used. Margin of equivalence of difference was set as -0.5 to 0.5 in this study.

Results:There were trivial differences between the two groups from post-op 1 year to 2 year. However, there was no difference between the two groups from post-op 3 year through 9 year. Visits for sinusitis gradually decreased in both groups. In the rare and frequent pre-operative sinusitis group, there were minor differences in both groups from post-op 1 year to 2 year. In contrast, there were no differences between the two groups in rare and frequent pre-operative sinusitis groups from post-op 3 year through 9 year. In the 0-4 year old group, there were minor differences between both groups from post-op 1 year to 2 year. However, no differences in the number of visits for sinusitis were found between the two groups during follow up periods from post-op 3 year through post-op 9 year. Additionally, there were no differences between the two groups during the entire follow up period.

Conclusions:Adenoidectomy does not reduce post-operative visits for sinusitis. Sinusitis decreased over time whether adenoidectomy was performed or not.

RHOP II

RM 3-2 (Emerald B)

Chair : Chuan Hsiang Steve KAO, Kyung-Su KIM

Rhinoplasty

» **RHOP-06 10:30~10:40**

» Monounit alar rim graft for correction of alar rim deformity

*Department of Otorhinolaryngology, Ulsan university
college of medicine, Asan medical center*

Shin Ae KIM, Yong Ju JANG

Objectives:As the effort to correct various alar rim deformities, techniques such as alar rim graft, lateral crural strut graft, and articulated rim graft have been used. Here, we introduce "Monounit alar rim graft" technique as another option for correction of alar rim deformity.

Methods:16 case series of rhinoplasties which was performed using "Monounit alar rim graft" technique done by a single surgeon (Y.J.J) in Asan Medical Center between May 2017 to December 2017 were retrospectively reviewed. Preoperative and postoperative facial photos were compared to determine surgical outcomes. Surgical technique involved open approach with costal cartilage harvesting at all times. Cortical part of harvested costal cartilage was cut into a 1mm thickness strip using dermatome blade. The prepared cartilage graft was soaked with saline for about 15 minutes to let natural warping occur. Curved cartilage graft was trimmed at both ends to make them into a round shape, and then suture on top of the tip as an inverted U-shape that it interpose with the starting point of lateral crura but distal ends of the graft go more caudally than the lateral ends of lateral crura.

Results:Of 16 cases, 9 (56.3%)were men and 7 (43.8%) were women, mean age was 37 (range 6-71) years old, 9 (52.9%) were revision case and 2 (11.8%) were performed with forehead flap reconstruction. Parenthesis deformity

was detected in 5 (29.4%) patients preoperatively, all of which resolved postoperatively. Alar concavity from the basal view was detected from 9 (52.9%) patients preoperatively, 5 (55.5%) of them resolved completely, 4 (44.4%) of them still had concavity but they were notably improved. 4 (23.5%) patients had tear drop shaped nostril from basal view preoperatively, 2 (50%) of them resolved that completely, 2 (50%) still had tear drop shape but as an improved extent.

Conclusions: Our new “Monounit alar rim graft” technique can serve as another option for treating various alar rim deformities.

» **RHOP-07 10:40~10:50**

» Correction of nasal tip bulbosity through elliptical skin excision

Shimmian Rhinoplasty Clinic
Sang Min HYUN, Dong-Hak JUNG

Objectives: Rhinoplasty is an operation that aims to improve the nasal function and appearance by correction the structural deformations of the nose. However, even if the deformation of the cartilage and nasal bone is completely corrected, the aesthetic outcome after rhinoplasty is sometimes unsatisfactory if there is a problem of skin soft tissue envelope. Therefore, we will introduce various skin excision techniques that can be used in rhinoplasty.

Methods: The retrospective study included 53 patients who underwent external skin excision with rhinoplasty from February 1st, 2015, through June 31st, 2017. We used 3 kinds of external skin excision technique to resolve the problem of skin soft tissue envelope on the nose; single vertical excision, bilateral vertical excision, bilateral horizontal excision.

Results: Single vertical excision has been used in 42 patients, bilateral vertical excision in 7 patients, and bilateral horizontal excision in 4 patients. Most of the patients were satisfied with their outcomes, but 7 cases required scar revision and another 2 cases required revision

for unsatisfactory result due to insufficient excision of nasal skin which ultimately yielded satisfactory results.

Conclusions: Elliptical skin excision can improve aesthetic outcome in patients with thick, inelastic skin and the external scar on nose. Skin excision is not recommended to be used freely in rhinoplasty because of the risk of the external scar. However, it is important to be aware that skin excision can be one way to get better results if satisfactory results are impossible to get by any other methods.

» **RHOP-08 10:50~11:00**

» Three-dimensional measurement for the prediction of the nasal septum size and shape using 3D-image reconstruction of computed tomography scan

Department of Otorhinolaryngology, Seoul National University College of Medicine, Seoul, Korea
Younghoon CHO, Sangyoon HAN, Minkyung KIM, Doo Hee HAN, Tae-Bin WON, Hyun Jik KIM, Dong-Young KIM

Objectives: Nasal septum is often deviated and has a three-dimensional structure. The planar image of computed tomography (CT) scan, as the conventionally most useful tool for the evaluation of the nasal septum, often does not provide sufficient information such as the size of its sub-portion and degree of deviation. In this study, we aimed to demonstrate the usefulness of three-dimensional measurement for the prediction of nasal septum size and shape using 3D-image reconstruction.

Methods: Axial images of CT scan were exported into DICOM format, then three-dimensionally reconstructed using InVesalius 3.1. Thresholding sufficed along the high Hounsfield units correlated to bony portion, and then regions of interest were placed around the nasal septum, and then bony structures including nasal bone, vomer, perpendicular plate of ethmoid bone and nasal floor were reconstructed. For the measurement, the model was converted from mesh to poly-surface using Rhinoceros 5.0.

The cartilaginous nasal septum was separated into 3 to 5 planar surfaces along with its curvature and shape, and then total area and its length were calculated. 3D-visualization was also performed.

Results: Three-dimensional structure of bony nasal septum was well visualized. Spur, crest, curvature and angulation could be identified. The area of cartilaginous septum was measured using 3D-image reconstruction, and well correlated with a real measurement value in the operation field.

Conclusions: 3D-image reconstruction of nasal septum provided 3D visualization of anatomy and its pathologic condition. It may help not only to communicate with medical teams or patient, but also to establish surgical plan. The measurement of cartilaginous nasal septum may be helpful in rhinoplasty, because the amount of harvestable septal cartilage can be predicted. The 3D model can be also useful in a patient with deviated nasal septum as three-dimensional structure; therefore this method is superior to conventional 2D measurement of planar image and more practical.

» **RHOP-09 11:00~11:10**

» Use of mastoid periosteum graft in primary and secondary rhinoplasty

Doctor Jins Premium Nose Clinic
Jong Sook YI, Hong Ryul JIN

Objectives: Many grafts used in rhinoplasty present the potential problem of visibility, dislocation, absorption and infection. To overcome these problems and obtain smoother surface, the author initiated the use of mastoid periosteum (MP) in primary and revision rhinoplasty. The objective of this study is to assess the efficacy of mastoid periosteum and report treatment outcome.

Methods: During last 3 years, MP was used in 62 primary and revision rhinoplasty patients. Of 62 patients, 17 patients who were followed up for more than 6 months (6 to 24 months, mean, 13 months) with available

photographs were analyzed. MP was harvested from the post-auricular area and used alone or in combination with cartilage underlay for radix and dorsal augmentation. Medical documents including operation records were reviewed to analyze the techniques, complications, and surgical results. Aesthetic result was scored on a scale of 0 to 4 (0 = poor, 1 = fair, 2 = moderate, 3 = good, 4 = excellent) with photograph evaluation by 2 independent surgeons

Results: MP was used in 10 primary and 7 revision cases. Graft was used to augment the radix (10 cases), dorsum (4 cases) and both radix and dorsum (3 cases). Cartilage was combined with MP in 9 patients (52.9%, 4 in radix graft, 5 in dorsal graft). The mean surgeon-reviewed outcome score was 2.8 (3.2 in primary and 2.3 in revision cases). Among revision cases, male cases showed poor treatment outcome than female group (1 vs 3.25). There was no outcome score difference between radix and dorsum graft. ($p>0.05$) There were 1 case of slight over correction, 3 cases of partial resorption, and 1 case of graft dislocation. Donor site morbidity and other complications were not found.

Conclusions: MP is a safe autogenous graft material to augment the radix or dorsum either alone or in combination with autogenous cartilage. Long-term partial resorption cannot be completely excluded which necessitates further study.

» **RHOP-10 11:10~11:20**

» Nasal and septal anthropometric measurements - implications for Asian septorhinoplasty

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Sung Dong CHO, Sung Joon PARK, Doo Hee HAN, Hyun Jik KIM, Dong-Young KIM, Tae-Bin WON

Objectives: Asian septorhinoplasty includes characteristics that distinguish the procedure from its Caucasian counterpart. Anatomical differences of the Asian nose coupled with differences in aesthetic standards demand

that they be approached in a unique way. In this study, we compared various nasal and septal measurements of Koreans vs Caucasians to search for anatomic differences that can ultimately help in choosing the best technique when performing septorhinoplasty in Asians.

Methods: Retrospective radioanatomic study was conducted with CT scans of 58 patients without any evidence of previous surgery, definite pathology in paranasal sinuses, and history of trauma. The septal cartilage area, skin thickness at the level of nasion and rhinion, and the distance between the superior end of septal cartilage and perpendicular line drawn along the rhinion (septal cartilage depth) was measured in the mid-sagittal image. Also, nasal bone width, internal and external nasal valve angle, and pyriform aperture length were measured in the axial images. These measurements were compared between age, gender, and each ethnic groups.

Results: 33(56.8%) Koreans and 25(43.2%) Caucasians were included in this study. Pyriform aperture width ($25.4 \pm 1.65\text{mm}$ vs $24.3 \pm 2.94\text{mm}$, $p=0.013$) and internal nasal valve angle ($33.4 \pm 10.7^\circ$ vs $29.8 \pm 6.76^\circ$, $p=0.041$) were different between Koreans and Caucasians. Cartilage area in Koreans was different between male and female ($864.1 \pm 212.3\text{mm}^2$ vs $729.4 \pm 112.4\text{mm}^2$, $p=0.011$). The skin thickness at the level of nasion tends to increase with age in both ethnic groups ($p=0.07$, linear by linear association).

Conclusions: Nasal and septal dimensions showed ethnic differences as well as variances according to gender and age among the same ethnic group. These differences should be taken into consideration when performing septorhinoplasty in Asians.

» **RHOP-11 11:20~11:30**

» No scar tip surgery in rhinoplasty: A case series study

Department of Otorhinolaryngology-Head and Neck Surgery, College of Medicine, The Catholic University of Korea

**Joohyung LEE, Seon Ik KIM, Jin bu HA,
Dongchang LEE, Se Hwan HWANG, Soo Whan
KIM, Byung Guk KIM, Jun Myung KANG**

Objectives: In case of need for tip surgery such as tip sutures, tip grafts, and septal extension grafts, common approach to the tip is transcolumellar external approach. Moreover most of textbooks say tip surgeries are indication of external approach. In spite of many advantages of external approaches, however, inevitable external scar remains much or less. Most of patients and surgeons would favor no scar if equivalent results to open approach can be accomplished. We will present techniques of the tip surgeries without columellar incision.

Methods: Techniques of tip surgery without columellar scar will be described. Main difference is that these use extended marginal incisions and hemitransfixion or transfixion incisions. Tips and pitfalls will be detailed.

Results: Cases using these techniques had comparable results to tip surgeries via open approach.

Conclusions: Various tip surgeries without columellar scar are possible technically in Asian rhinoplasty.

RHOP III

RM 3-2 (Emerald B)

Chair : Seung Hoon LEE, Sethu T SUBHA

Tumors

» **RHOP-12 11:30~11:40**

» Postoperative cerebrospinal fluid leak after skull base surgery a meta-analysis and systematic review

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Sungkyunkwan University School of Medicine

Jong-Seung KIM¹, Sang-Duk HONG²

Objectives:CSF leakage is a complication that any surgeon with skull base surgery is not willing to suffer. The approaching method to the skull base is often different, and the various size and location of the skull base lesion makes it difficult to discuss CSF leakage. It is meaningful to investigate which factors contribute to postoperative CSF leakage.

Methods:Related studies were identified by searching the following databases: Medline, Embase, and Web of Sciences through July 2017. Random-effects models were used to calculate odds ratio (OR) and 95% confidence intervals (CIs). The Newcastle-Ottawa scale was used to evaluate the quality of observational studies.

Results:Our search yielded 44 retrospective cohort studies involving a total of 8022 skull base surgeries. Overall rate of postoperative CSF leakage was 8.6%. The effect of obesity on postoperative CSF leakage revealed an odds ratio of 1.91. ($p<0.01$) The effect of perioperative radiotherapy on postoperative CSF leak revealed a odds ratio of 2.25. ($p<0.01$) High intraoperative flow rate also had an significant odds ratio of 2.98 ($p<0.01$). On the contrary, pedicled vascularized flap efficiently reduced the risk of postoperative CSF leak (OR: 0.52) Defect size and the presence or absence of lumbar drain have no effect on postoperative CSF leak. ($p>0.05$, respectively) Regarding the surgical approach, transsellar approach significantly reduced the risk of postoperative CSF leak (OR: 0.48, $p<0.01$) and transclival approach raised the risk of postoperative CSF leak (OR: 3.47, $p<0.01$)

Conclusions:The most comprehensive and quantitative assessment regarding postoperative CSF leak showed that obesity, perioperative radiotherapy, high intraoperative CSF flow rate, transclival approach raised the risk of CSF leakage, however, transsellar approach and pedicled vascularized flap are major factors to reduce the risk of postoperative CSF leak.

» **RHOP-13 11:40~11:50**

» Post-operative infections in skull base and brain malignant tumor surgeries risk factors and oncological outcomes

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Han-Gyeol PARK, Doo-Hee HAN, Tae-bin WON, Hyun-jik KIM, Seon Ha BAEK, Dong-Young KIM

Objectives:We hypothesized that intracranial infections after skull base and brain malignant tumor surgeries might reduce recurrence and improve oncological outcomes. We aimed to evaluate the incidence, risk factors, causative pathogens, and oncological outcomes of post-op infections in patients with skull base(SB) and brain malignant tumors
Methods:From 2010 January to 2017 December, 182 patients with malignancy who underwent SB or brain surgeries were included. We analyzed the presence of post-op infections, risk factors, pathogens, and recurrence rate and disease-free survival.

Results:Anaplastic astrocytoma(AA) was the most common malignancy (N=108, 59.3%). Olfactory neuroblastoma(ON) (N=15, 8.2%) are followed. 11 cases of post- op infection were enrolled (6.0%); 9 cases of meningitis, 1 case of brain abscess, 1 case of wound infection. MRSE, VRE, MRCNS, Staphylococcus Capitis were isolated. But,in 7 cases, pathogens were not identified. In AA, recurrence rate was 53.5% (53/99) in non-infection group, whereas, 77.8% (7/9) in infection group, which was higher than that in non- infection group. But,it was not statistically significant($P=0.16$). CSF leakage rate was 1% (1/99) in non-infection group, and 11.1% (1/9) in infection group. It was significantly higher in infection group ($P=0.03$). RT Hx before operation was 6% (6/99) in non-infection group, and 33.3% (3/9) in infection group, which was significantly higher than that in infection-free group ($P=0.01$). AVG disease-free survival of non-infection

group was 30.9 month, and 17.3 month in infection group ($P=0.03$). In ON, operations included 9 cases of endoscopic craniofacial resection (CFR) and 6 cases of conventional CFR. only 1 case of brain abscess after endoscopic CFR was developed.

Conclusions: Our study suggests that post-op infection is a rare complication of SB and brain malignant tumor surgery, and it is related with CSF leakage and previous RT Hx. In contrast to hypothesis, infections seem to worsen oncological outcomes in malignant tumors.

» **RHOP-14 11:50~12:00**

» Early experience with a patient-specific virtual surgical simulation for rehearsal of endoscopic skull-base surgery

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Objectives: With the help of contemporary computer technology it is possible to create a virtual surgical environment(VSE) for training. This study describes a patient specific virtual rhinologic surgical simulation platform that supports rehearsal of endoscopic skull-base surgery. We also share our early experience with select cases.
Methods: A rhinologic VSE was developed, featuring a highly efficient direct 3-dimensional volume renderer with simultaneous stereoscopic feedback during surgical manipulation of the virtual anatomy, as well as high-fidelity haptic feedback. We conducted a retrospective analysis on 10 patients who underwent various forms of sinus

and ventral skull-base surgery to assess the ability of the rhinologic VSE to replicate actual intraoperative findings.

Results: In all 10 cases, the simulation experience was realistic enough to perform dissections in a similar manner as in the actual surgery. Excellent correlation was found in terms of surgical exposure, anatomical features, and the locations of pathology.

Conclusions: The current rhinologic VSE shows sufficient realism to allow patient-specific surgical rehearsal of the sinus and ventral skull base. Further validation studies are needed to assess the benefits of performing patient specific rehearsal

» **RHOP-15 12:00~12:10**

» Endoscopic prelacrima medial maxillectomy for maxillary and infratemporal fossa tumors

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Ahmad AALMAGRIBI, Sang Duk HONG, Gwanghui RYU, MinYoung SEO, Kyung Eun LEE, Hyo Yeol KIM, Seung-Kyu CHUNG, Hun-Jong DHONG

Objectives: Endoscopic prelacrima medial maxillectomy was previously reported to treat inverted papilloma. Recently we have used this technique for various kinds of pathology in maxillary sinus and infratemporal fossa. In this study, I would like to show the cases treated by this modified technique

Methods: Eleven patients who underwent endoscopic prelacrima medial maxillectomy at our hospital between October 2015 and November 2017 were included in this study.

Results: Six inverted papilloma, one adenoid cystic carcinoma, one ameloblastoma, one ossifying fibroma, two infratemporal fossa tumors (trigeminal schwannoma and malignant meningioma) were enrolled. There was no recurrence in patients with inverted papilloma (Follow-up

of 1 – 19 months). There was 2 residual tumor (adenoid cystic carcinoma and malignant meningioma) that were confirmed postoperatively. Another three patients were free of disease (Follow-up of 6 – 18 months). The inferior turbinate remained unchanged in all 11 patients without atrophy. No patients experienced epiphora. One patient experienced transient numbness of upper lip.

Conclusions:Endoscopic prelacrima medial maxillectomy was safe and effective to resect inverted papilloma. This approach could be used various pathology in maxillary sinus and infratemporal fossa.

» **RHOP-16 12:10~12:20**

» The clinical outcome of head and neck malignancy patients using integrated positron emission tomography computed tomography (PET/CT)

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Sethu Thakachy SUBHA¹, Fathinul Fikri Ahmad SAAD², Abdul Jalil NORDIN², Saraiza Abu BAKAR³, Muhamad AZRIF³

Objectives:The incidence of head and neck cancers in Malaysia is raising. Adding to the limitation of conventional imaging modalities, there are substantial number of patients presented with carcinoma of unknown primary where accurate staging is an important prognostic determinant of the disease outcome. Thus, the aim of this study is to find the usefulness of FDG PET/CT in head and neck cancer staging comparing to clinical staging.

Methods:This prospective study involved patients from ENT clinic of Hospital Serdang and Hospital UKM. All patients were histologically proven primary head & neck malignancy and clinically staged using TNM staging

system. All patients also underwent whole body 18F-FDG PET/CT study at the Diagnostic Nuclear Imaging Centre of Universiti Putra Malaysia. The clinical staging and PET/CT results were compared. This study had prior approval from institutional ethic committees.

Results:There were 24 patients involved in this study with male preponderance (168) and mean age 51.5. Nasopharyngeal carcinoma has the highest incidence, followed with laryngeal, thyroid and oropharyngeal carcinomas. The adenexal, occult primary, lymphoma, sarcoma and metastatic adenocarcinoma are less common. 18F-FDG PET/CT provided additional information in 66% of patients, upstaged 58% of patients with significant change in tumor, nodal and metastases staging comparing with clinical staging. **Conclusions:**18F-FDG PET CT can be important single modality in head and neck malignancy for adequate treatment planning in view to minimize treatment related toxicity & functional impairment.

» **RHOP-17 12:20~12:30**

» Prelacrima recess approach for maxillary sinus inverted papilloma: A preliminary study

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Myung-Jun LEE, Jae-Mahn CHO, Yong Wan KIM

Objectives:Various surgical approaches have been employed for complete resection of inverted papilloma (IP) of the nose and paranasal sinus. It is often unavoidable to sacrifice the inferior turbinate (IT) and nasolacrimal duct (NLD) due to the anatomy of maxillary sinus. However, prelacrima recess approach (PLRA) provides a wider entrance to maxillary sinus without ablation of NLD and IT. We present 7 cases of IP successfully treated by the PLRA.

Methods:We collected consecutive data from 7 cases involving patients who underwent resection of IP by means

of the PLRA from 2016 to 2017. If the lesion could not be removed via middle meatal antrostomy (MMA), the PLRA was indicated. The surgical specimens were all confirmed to be IP.

Results: Preoperative imaging studies demonstrated that the lesions of IP were located mainly in the maxillary sinus. All the 7 patients had unilateral lesions and all tumors were completely resected via the PLRA. The follow-up ranged from 3 to 24 months. No recurrence was seen in 7 patients and all of them had no any complications.

Conclusions: The PLRA provides an adequate operation field without unfavorable scars. It allows for preservation of sinus structure and function. The PLRA is feasible and can be used for the diffuse maxillary sinus inverted papilloma.

RHOP IV

RM 2-2 (Skylark)

Chair : Yong-Dae KIM, Do-Yeon CHO

Rhinosinusitis (Basic) I

» RHOP-18 13:30~13:40

» Generation of mouse model of eosinophilic chronic rhinosinusitis using multiple airborne allergens

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**Sang Chul PARK¹, Soo In KIM^{2,3},
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CHO^{1,2,4}, Joo-Heon YOON^{1,2,4,5},
Chang-Hoon KIM^{1,2,3,4}**

Objectives: Eosinophilic chronic rhinosinusitis (ECRS) is clinically significant, because it is difficult to treat and prone to recur. To mimic ECRS in mouse study, there are various investigations. However, most of them used ovalbumin, which does not cause sinusitis in humans. Thus, the aim of our study was to develop a mouse model of ECRS using clinically relevant airborne allergens. In addition, we examined the effects of exposure duration of allergens by time-course analysis.

Methods: Naïve C57BL/6 mice were exposed intranasally to multiple airborne allergens (*Alternaria alternata*, *Aspergillus fumigatus*, Protease from *Staphylococcus aureus*, and house dust mite) three times per week for 4, 8, 12, or 16 weeks. Phosphate-buffered saline treated mice were used as controls. Histopathological change of nasal mucosa was analyzed by hematoxylin-eosin stain for general morphology, Sirius red stain for eosinophils, Masson's trichrome stain for collagen deposition, and periodic acid-Schiff stain for goblet cells. Various cytokines in nasal lavage fluid was evaluated by ELISA. Total and differential cell counts from serum, nasal lavage fluid, and spleen were analyzed with hemocytometer and flow cytometry, respectively.

Results: In ECRS groups, eosinophil infiltration was observed from 4-week challenge, then subsequently increased with time period. Subepithelial mucosal thickness was significantly increased from 8-week challenge; furthermore, epithelial disruption and goblet cell hyperplasia were identified from 12-week challenge in ECRS group. Although we could not find significant difference of cytokine expression in both groups, total cell count from nasal lavage fluid, and eosinophil count from serum and spleen increased in ECRS group.

Conclusions: We successfully developed an in vivo model of ECRS using multiple airborne allergens. Prolonged exposure to airborne allergens over 12 weeks, which corresponds to the definition of human ECRS, particularly induced eosinophil infiltration as well as tissue remodeling.

» **RHOP-19 13:40~13:50**

» Increased expression of lymphotoxin in chronic rhinosinusitis and its possible contribution to the innate and adaptive immune response

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**Young Ho JOO, Jae Woong HWANG, Tae Hoon
KIM, Sang Hag LEE**

Objectives: Ectopic lymphoid follicles, also called tertiary lymphoid organ, have a composition and organization reminiscent of the secondary lymphoid organs. They occur in several chronic inflammatory diseases and are formed by lymphoid neogenesis. Actually recent report suggest that ectopic lymphoid tissues are expressed in chronic rhinosinusitis. Furthermore, chronic inflammation in various organs activates lymphocytes to express the cytokine lymphotoxin. The present study is to evaluate whether lymphotoxin may be expressed in chronic rhinosinusitis, and investigate the role of lymphotoxin on innate and adaptive immune responses in chronic rhinosinusitis.

Methods: we evaluated the expression of lymphotoxin alpha, lymphotoxin beta, TNF-alpha, TNF superfamily molecule (LIGHT), lymphotoxin beta receptor, herpes virus entry (HVEM), and decoy receptor three (DcR3) in normal and inflammatory sinus mucosa of patients with chronic rhinosinusitis with or without nasal polyps. In cultured cells stimulated with LIGHT, the expression of chemokines, epithelial permeability and endothelial permeability were measured.

Results: The expression levels of lymphotoxin alpha, lymphotoxin beta, TNF alpha, LIGHT was increased in chronic rhinosinusitis with nasal polyps than chronic rhinosinusitis without nasal polyps, or normal healthy mucosa. Lymphotoxin beta receptor, HVEM, and DcR3 were localized to the epithelial cells and endothelial cells. Lymphotoxin alpha, lymphotoxin beta, TNF alpha, and LIGHT induced increased epithelial and endothelial permeability

Conclusions: the present results showed that LIGHT, HVEM, DcR3, and lymphotoxin beta receptor were expressed in normal ethmoid sinus mucosa and their levels are increased in chronic rhinosinusitis with nasal polyps. These results suggest that lymphotoxins may participate in the innate and adaptive immune response, contributing to the pathogenesis of chronic rhinosinusitis.

» **RHOP-20 13:50~14:00**

» Korean red ginseng for enhancing transepithelial chloride transport and inhibiting bacterial growth

*Dep. of Otolaryngology, Univ. of Alabama at
Birmingham*

**Do-Yeon CHO, Dong Jin LIM, Daniel SKINNER,
Shaoyan ZHANG, Calvin MACKEY, Bradford A.
WOODWORTH**

Objectives: Chronic rhinosinusitis (CRS) is a chronic status where improper mucociliary clearance (MCC) retards the transepithelial movement of ions including chloride, increasing local inflammation and bacterial infection. Enhancing MCC would become the good therapeutic strategy for CRS by restoring the clearance of bacterial pathogens. Ginseng is a traditionally widely used medicinal plant that has multi-functional properties including antibacterial, anti-oxidant, and anti-inflammatory activity, which would improve the symptoms of CRS. The aim of this study was to evaluate the potential of red ginseng aqueous extract (RGAE) on improving MCC and inhibiting the bacterial growth.

Methods: Wild type (WT) and transgenic CFTR -/- primary murine nasal septal epithelial (MNSE) were utilized for observing transepithelial chloride secretion in the Ussing Chamber by RGAE. Ciliary beat frequency (CBF) was also measured to confirm the effect of RGAE on the MCC. In the presence of the ginseng extract, the biofilm formation of *Pseudomonas* strain PAO1 was quantified by crystal violet staining and relative biofilm

inhibitions were studied.

Results:RGAE (at 200 μ g/ml Ginsenosides) significantly increased Cl⁻ transport measured as change in short-circuit current (Δ ISC= μ A/cm²) when compared to vehicle control in WT MNSE (35.1 $\pm$ 3.1 vs 0.1 $\pm$ 0.2, $p < 0.05$) and CFTR^{-/-} MNSE (32.6 $\pm$ 2.0 vs 0.2 $\pm$ 0.3, $p < 0.05$) indicating that effects are independent of CFTR. CBF (fold-change/baseline) was significantly increased compared to control in WT MNSE (2.05 $\pm$ 0.2 vs 1.25 $\pm$ 0.0, respectively $p < 0.05$). RGAE markedly reduced PAO1 biofilm formation compared to controls (optical density at 590nm = 0.18 $\pm$ 0.03 vs 0.28 $\pm$ 0.02, $p < 0.001$).

Conclusions:RGAE activates transepithelial Cl⁻ secretion, while inhibiting PAO1 biofilm formation. These findings suggest RGAE has therapeutic potential for both CF and non-CF CRS with *P. aeruginosa*. Further in vivo studies are planned.

» **RHOP-21 14:00~14:10**

» Glucocorticoids ameliorate TGF- β 1-mediated epithelial-to-mesenchymal transition of airway epithelium through MAPK and Snail/Slug signaling pathways

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Objectives:Chronic rhinosinusitis with nasal polyps (CRSwNP) is closely associated with tissue remodeling. Epithelial-to-mesenchymal transition (EMT), a process of tissue remodeling, can be a therapeutic target of CRSwNP. Glucocorticoids are a type of steroid hormone that is used primarily in medical therapy for patients with CRSwNP; however, their effects on EMT in the airway epithelium remain unknown.

Methods:A549 cells, human primary nasal epithelial

cells (hPNECs), or ex vivo organ culture of the inferior turbinate were exposed to dexamethasone and fluticasone propionate prior to stimulation with TGF- β 1. Expression levels of E-cadherin, vimentin, fibronectin, α -smooth muscle actin (α -SMA), Mitogen-activated protein kinase (MAPK) phosphorylation, Snail and Slug were determined by western blotting and/or immunofluorescent staining. We assessed the change in migration capacity of A549 cells by using cell migration assay and transwell invasion assay. Small interfering RNA (siRNA) Snail and Slug were transfected to suppress Snail and Slug expression.

Results:TGF- β 1 induced changes in cell morphology, suppressed the expression of E-cadherin and enhanced the expression of α -SMA, vimentin and fibronectin in A549 cells. However, glucocorticoids inhibited EMT, migration and invasion enhancement by TGF- β 1. We found that the induction of phosphorylated ERK, p38 and the activity of Snail and Slug transcription factors by TGF- β 1 were suppressed by glucocorticoids. Glucocorticoids also had a similar effect in hPNECs and ex vivo organ cultures of the inferior turbinate.

Conclusions:These findings suggest that glucocorticoids might be a useful therapy for preventing tissue remodeling by blocking the EMT initiated by TGF- β 1- induced MAPK and Snail/Slug signaling pathways in CRSwNP.

» **RHOP-22 14:10~14:20**

» Effect of type 2 inflammation on airway surface liquid pH in chronic rhinosinusitis

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Objectives: Airway surface liquid (ASL) acidification impairs host defense and has been reported in severe asthma and cystic fibrosis. We recently reported that type-2 cytokines induce an omeprazole inhibitable H,K-flux via the nongastric H,K-ATPase in human nasal epithelial cells (HNECs). In this study, we evaluated if IL-13 acidifies ASL pH and whether omeprazole modulates this response in vitro. Furthermore, we identified whether ASL pH is altered in chronic rhinosinusitis with nasal polyps (CRSwNP) and whether it is associated with type-2 cytokines in nasal tissue in vivo.

Methods: HNECs cultured at the air-liquid interface were stimulated basally with 5ng/mL IL-13 in the presence or absence of omeprazole. Apical ASL pH was measured using a pH-sensitive SNARF- dextran dye. Nasal secretions were collected from control and CRS patients and pH was measured using a micro-pH meter. Inflammatory cytokine levels in nasal tissue from the same patients were assessed by Luminex assay.

Results: The ASL pH from IL-13-stimulated HNECs (7.20 ± 0.38) was significantly acidified compared to the ASL pH from unstimulated cells (7.39 ± 0.32 ; $P=0.03$). Omeprazole prevented IL-13-induced acidification of ASL pH (7.39 ± 0.35 ; $P=0.004$). Furthermore, the pH of nasal secretions was acidified in CRSwNP (6.16 ± 0.54) compared to control (6.56 ± 0.28 ; $P=0.006$) patients. Nasal secretion pH was significantly negatively correlated with type-2 cytokine levels, including IL-13, IL-4, and IL-5 (all $p<0.05$).

Conclusions: IL-13 acidified ASL pH in vitro and could be inhibited by omeprazole. Type-2-mediated inflammation was associated with acidified ASL pH in CRSwNP patients. Inhibition of IL-13- induced ASL pH acidification may provide therapeutic benefits to CRSwNP patients.

» **RHOP-23 14:20~14:30**

» Toll-like receptor 9 ligands increase type interferon induced B-cell activating factor expression in chronic rhinosinusitis with nasal polyposis

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Objectives: B-cell activating factor (BAFF) has been proposed to play a crucial role in the pathogenesis of chronic rhinosinusitis with nasal polyp (CRSwNP) patients. The aim of this study is to evaluate the role of toll-like receptor (TLR) 9-mediated BAFF activation on the pathogenesis of nasal polyposis

Methods: Nasal polyp (NP) tissue and uncinate tissue (UT) were obtained from 17 patients with CRSwNP, 10 patients with CRS without NP (CRScNP), and 18 normal control subjects. The expressions of TLR9, high mobility group box-1 protein (HMGB1), type I interferon (IFN), BAFF, and anti-double stranded DNA (dsDNA) antibody were examined in the tissues and cultured dispersed nasal polyp cells (DNPCs) by immunohistochemistry, immunofluorescence staining, real-time quantitative polymerase chain reaction, and enzyme-linked immunosorbent assay. Flow cytometric assay was used to explore the cellular origins of the Type I IFN and BAFF in nasal polyp tissue

Results: The protein level of TLR9, HMGB1, type I IFN, BAFF, and anti-dsDNA antibody were significantly elevated in NP tissue compared to the UTs. Exposure to TLR9 agonist increased the production of type I IFN in vitro, which further increased BAFF production in vitro. The main cellular source of the BAFF in the NPs were plasmacytoid dendritic cells, while the main cellular source

of the type I IFN in the NPs were B-cells, monocytes, and eosinophils

Conclusions:TLR9 signaling pathway plays a critical role in the pathogenesis of CRSwNP via increasing type I IFN induced BAFF production and may serve as a novel promising therapeutic target in patients with CRSwNP

RHOP V

RM 2-2 (Skylark)

Chair : Sourabha K PATRO, Mikyung YE

Sleep Related Breathing Disorders I

» RHOP-24 14:30~14:40

» Cluster analysis of polysomnographic features in patients with obstructive sleep apnea

Department of Otorhinolaryngology-Head and Neck Surgery, Seoul National University Bundang Hospital

Sung-Woo CHO, Chae-Seo RHEE, Chul Hee LEE, Jeong-Whun KIM

Objectives:Current golden standard in treatment of obstructive sleep apnea (OSA) is continuous positive airway pressure (CPAP). However OSA seem to be heterogenous, and current “one size fits all approach” make overall treatment results rather unsatisfactory. Therefore, we tried to find out the phenotypes of OSA by using cluster analysis
Methods:Cross-sectional analysis of patient cohort in a single center had been performed. Patients with OSA who took overnight polysomnography were included. Patients under age of 18 years and those with respiratory distress index less (RDI) than 5/hour were excluded. Clustering analysis based on polysomnographic features were performed. Principal component analysis for reduction of the variables was followed by K-means clustering analysis.
Results:1359 patients had been analyzed and 5 clusters were identified based on distinguishing polysomnographic

features. Cluster 1 (n=83) had moderate degree of OSA severity, frequent periodic limb movements with associated frequent awakening, and old age. Cluster 2 (n=255) had moderate degree of OSA severity, higher proportion of REM stage and stage 3 NREM, and young age. Cluster 3 (n=172) had severe degree of OSA, higher BMI, predominant apnea and hypoxemia, and frequent respiratory associated arousal. Cluster 4 (n=150) had severe degree of OSA, however was characterized as having predominant hypopnea, higher snoring time and less hypoxemia. Cluster 5 (n=542) had moderate degree of OSA, higher proportion of REM stage and state 2 NREM, and frequent spontaneous arousal. Mean Epworth sleepiness scale was higher in cluster 3 and 4 compared to other clusters.

Conclusions:Cluster analysis of OSA based on polysomnographic features had been performed. Each clusters had distinguishing features (phenotypes). Long term outcome according to these clusters should be evaluated in the future study. Based on these phenotypes, further understanding of heterogenous OSA pathogenesis and personalized treatments can be expected in the future.

» RHOP-25 14:40~14:50

» Correlation between endoscopic adenoid grade and obstructive sleep apnea severity

Department of Otorhinolaryngology-Head and Neck Surgery, Eulji University College of Medicine, Eulji Hospital

Ho Chan KIM, Yong Tae CHO, Ji-Sun KIM

Objectives:Adenoid hypertrophy is one of the anatomic structure making upper airway narrower. In pediatric patients, it is difficult to perform endoscopic nasopharynx exam due to poor cooperation, so PNS lateral view is usually used to find out adenoid vegetation. However, PNS lateral view had limitation to reflect adenoid hypertrophy in real situation. We try to evaluate the correlation between endoscopic adenoid grading scale and severity of sleep

apnea and usefulness of endoscopic adenoid exam on sleep disordered breathing patients.

Methods: We retrospectively reviewed the medical record of 53 pediatric patients who underwent polysomnography and endoscopic nasopharynx exam from January 2004 to September 2017. Patients were in sitting position and breathing through their nose. We graded the hypertrophy of adenoid with nasopharynx photo under Parikh adenoid grading scale and ACE adenoid grading scale.

Results: The mean age was 7.3 (range: 2 to 14) and there were 30 male patients (56.6%). There were no statistical relationship between two kinds of adenoid grading system and AHI severity, AHI scores in supine, decubitus, prone position, mean O₂ saturation, and minimal O₂ saturation in polysomnography. There were no statistical relationship between grade of adenoid hypertrophy and sleep apnea severity in small tonsil group (tonsil grade 0, 1, and 2; n = 28) and in large tonsil group (tonsil grade 3 and 4; n = 25), either.

Conclusions: Hypertrophy of adenoid was not related with the severity of obstructive sleep apnea in this study. Further study with larger sample size would be needed.

» **RHOP-26 14:50~15:00**

» The long-term effect of adenotonsillectomy on changes of position during sleep in pediatric obstructive sleep apnea

¹Department of Otorhinolaryngology-Head and Neck Surgery, Seoul National University College of Medicine, Boramae Medical Center, ²Department of Otorhinolaryngology-Head and Neck Surgery, Korea University College of Medicine, Korea University Ansan Hospital

Seung-No HONG¹, In Sik SONG²,
Seung Hoon LEE²

Objectives: Although adenotonsillectomy is known to influence on position change behavior during sleep, the data are limited to short-term follow up results. This study

aims to evaluate long-term effect of adenotonsillectomy on changes of position during sleep in pediatric obstructive sleep apnea.

Methods: A total of 19 pediatric patients (mean age = 11.1 years; male : female = 14 : 5) with OSA who underwent adenotonsillectomy were included in the study. Demographic data and serial polysomnographic parameters were obtained and analyzed. The preoperative and postoperative differences in the frequency of positional changes during sleep and the distribution of sleep positions were investigated.

Results: The mean follow up duration between the preoperative and postoperative polysomnography was 55.7 ± 22.3 months. The respiratory parameters including AHI, minimal oxygen saturation were improved. The total number of positional changes during sleep and positional change index significantly (9.7±5.0 [Pre-op] vs 4.0± 2.9 [Post-op]; p < 0.001) decreased after adenotonsillectomy. There was a statistically significant increase in the proportion of sleep time spent in supine position (44.7±19.0% [Pre-op] vs 63.4± 32.0% [Post-op]; p = 0.024) on long-term follow up.

Conclusions: The tendency to decrease in the frequency of positional changes and increase of supine position proportion during sleep was maintained in long-term follow up after adenotonsillectomy in pediatric OSA.

» **RHOP-27 15:00~15:10**

» Prevalence and characteristics of obstructive sleep apnea in Korean Myasthenia gravis patients

¹Department of Otorhinolaryngology-Head and Neck Surgery, ²Neurology, Kyungpook National University School of Medicine

Sung-Jae HEO¹, Jung-Soo KIM¹,
Jin-Sung PARK²

Objectives: Myasthenia gravis (MG) is an autoimmune disease and characterized by progressive and diurnal muscle weakness and sometimes with respiratory difficulty. There a

only few studies on obstructive sleep apnea (OSA) as one of the clinical symptom in MG which is caused by weakness of the oropharyngeal muscles. The prevalence of OSA in MG needs to be elucidated but according to a few studies, approximately 20-60% of the MG patients had OSA. The aim of our study was to find the prevalence of OSA in stable Korean MG patients and analyze the characteristics of OSA in these patients.

Methods: Eighteen MG patients were enrolled. All the patients consisted of MGCS 0 or 1 and all the patients had no change in their medication for at least 6 months. All the patients underwent an overnight PSG and Korean Epworth sleepiness scale (ESS). The clinical data constituted of BMI, disease follow up duration, post synaptic receptor antibody status, thymectomy status, pulmonary function test, and current medication usage.

Results: The mean age of the enrolled MG patients was 49.6 ± 11.1 with a mean 6.7 ± 5.3 years of follow up. The mean body mass index was 23.7 ± 3.4 and all the patients showed MGFA score of less than 1. The Korean ESS showed a prevalence of 27.8% (5 out of 18). The PSG showed an OSA prevalence of 7 out of 18 patients (38.9%) (AHI > 5), and of these patients 2 patients were mild, 3 patients were moderate and 2 patients were severe.

Conclusions: In conclusion, prevalence of OSA in stable Korean MG patients was 38.9% which was higher than the normal population. There was no statistical significance between the two groups in relation to BMI, disease duration or steroid medication exposure. Further well designed longitudinal studies are warranted to understand the pathophysiology of OSA in neuromuscular disease which is one of the under recognized clinical symptom in MG.

» **RHOP-28 15:10~15:20**

» Prevalence of obstructive sleep apnea in obese pregnant women and its effects on pregnancy-related complications

¹Department of Otorhinolaryngology-Head and Neck

Surgery, Samsung Medical Center, Sungkyunkwan University School of Medicine, ²Department of Obstetrics and Gynecology, Samsung Medical Center, Sungkyunkwan University School of Medicine
Gwanghui RYU¹, Yoo Min KIM², Sang Duk HONG¹, Hun-Jong DHONG¹, Seung-Kyu CHUNG¹, Soo-young OH², Hyo Yeol KIM¹

Objectives: Maternal obesity is highly associated with obstructive sleep apnea (OSA) during pregnancy especially in the third trimester. OSA and obesity are related with poor gestational outcomes. The aim of study was to identify prevalence of OSA in obese pregnant women and to evaluate the effects of OSA on pregnancy-related complications and fetal growth.

Methods: This prospective cohort study enrolled pregnant women who were obese (BMI ≥ 24 at gestational age 30 weeks) between June 2017 and December 2017. Eligible participants were evaluated for OSA using in-home portable polysomnography (PSG). Clinical data were collected including age, body weight, height, BMI, apnea-hypopnea index (AHI), gestational complications (GDM, preeclampsia, or preterm delivery), and infant weight.

Results: Thirty-two pregnant women were enrolled and completed a PSG. Mean age was 34.5 years (range of 28-44 years) and 19 (59%) were nullipara and 13 (41%) were multipara. Six patients (18.8%) diagnosed as GDM, 5 (15.6%) had preeclampsia, and 4 (12.5%) patients were experienced preterm labor. AHI was correlated with age ($r=0.388$; $P=0.028$), pregestational BMI ($r=0.408$; $P=0.021$) and BMI ($r=0.468$; $P=0.007$) at enrollment. Age and BMI revealed no significant correlation. AHI was associated with age (B-coefficient, 0.53; 95% CI, 0.03-1.03; $P=0.04$) and pregestational BMI (B-coefficient, 0.67; 95% CI, 0.28-1.05; $P=0.001$). After adjusting for pregestational BMI and age, OSA was associated with increased odds of preeclampsia (OR, 19.2; 95% CI, 1.11-330.41; $P=0.042$). The effects of OSA on GDM, preterm labor, and small for gestational age were not statistically significant due to the small size of samples. However, among the PE patients,

preterm labor occurred in four patients.

Conclusions: Older age and high BMI were associated with OSA during pregnancy. OSA was an independent high-risk factor for preeclampsia and it related with preterm labor. OSA evaluation is mandatory for obese pregnant women.

» **RHOP-29 15:20~15:30**

» Effect of adenotonsillectomy on attention in Korean children with sleep disordered breathing

Department of Otorhinolaryngology Head and Neck Surgery, Chuncheon Sacred Heart Hospital, Hallym

University College of Medicine

Sung Hee BAE, Sung Min LEE, Kang Hyun LEE, Sangwook KIM, Ho Jun LEE, Dong-Kyu KIM

Objectives: Pediatric sleep-disordered breathing (SDB) is a common debilitating disorder that can adversely affect the attention and academic performance of school-age children. Unfortunately, only a few studies have examined the effect of SDB treatment on attention in pediatric populations. Therefore, the aim of this study was to prospectively investigate the effect of SDB treatment on attention in children

Methods: Consecutive children with SDB and adenotonsillar hypertrophy were enrolled. All subjects underwent standard-of-care treatment (adenotonsillectomy or close observation) and were evaluated using a computerized comprehensive attention test at the initial visit. Comprehensive attention tests consisted of both sustained and divided attention tasks. Each completed task was assigned an attention score, which was based on the number of omission or commission errors. The comprehension attention test was repeated one year later

Results: A total of 171 children who underwent adenotonsillectomy and 32 children who did not undergo adenotonsillectomy were included in this study. At baseline, there was no significant difference according to the score of all type comprehension attention tests between children in the adenotonsillectomy group and in

observation group. One year after treatment, children in the adenotonsillectomy group had significantly improved scores in all attention tasks. Children in the observation group had an only significant improvement in omission errors on sustained attention tasks. Meanwhile, the attention score based on commission errors of divided attention tasks was significantly worse than at baseline for those.

Conclusions: Our study showed that adenotonsillectomy may be helpful in improving attention in children with SDB.

RHOP VI

RM 2-2 (Skylark)

Chair : Byoung Joon BAEK, Yoshitaka OKAMOTO

Best oral Presentation

» **RHOP-30 16:50~17:00**

» Comparison of factors affecting dropout rate and compliance of two differed methods of immunotherapy in patients with allergic rhinitis

Department of Otorhinolaryngology-Head and Neck Surgery, School of Medicine, Kyung Hee University

Su Young JUNG, Hye Kyu MIN, Jin-Young MIN, Kun Hee LEE, Sung Wan KIM

Objectives: For the success of immunotherapy (IT) of allergic rhinitis (AR), it is very important for the patient to adjust to long-term treatment. The purpose of this study is to analyze the dropout rates of IT and to investigate the affecting factors for compliance of dropout patients.

Methods: Of the 1934 patients who underwent SCIT and 259 patients who underwent SLIT from 2002 to 2017 at the Kyung Hee Medical Center, patients who stopped treatment within three years were included. 180 of the 1318 patients in the SCIT group and 30 of the 153 patients in the SLIT group responded to the telephone

interview.

Results:The total dropout rate was lower in the SLIT group than in the SCIT group (59.1 vs 68.1%, $p=.024$). Mean dropout time was significantly faster in the SLIT group than in the SCIT group (6.1 ± 4.5 vs 10.0 ± 8.8 mo, $p<.001$). In the SCIT group, 55 patients(30.6%) discontinued treatment because of the “no improvement of symptoms”, followed by “discomfort for treatment method($n = 48$, 26.7%)”, and “far away from hospital($n=34$, 18.9%)”, respectively. In SLIT group, 16 patients (53.3%) had 'far away from hospital' as the reason of discontinuation of treatment, 9 patients (30%) had 'no improvement of symptoms', each 6 patients (20%) had 'discomfort for treatment method' and 'too expensive cost', respectively. In both groups, the younger the age of onset of treatment, the earlier the cessation of treatment (SCIT: $r=-.312$, $p=.031$, SLIT: $r=-.298$, $p=.018$). However, other factors did not show a significant correlation with the dropout time of IT.

Conclusions:In AR patients who have received IT, dropout period is related to the age at onset of IT. It was also found that there were various reasons for dropout the IT depending on the antigen administration method. Based on these results, appropriate patient education is needed to allow the patients to maintain their treatment for a sufficient period of time when performing IT.

» **RHOP-31 17:00~17:10**

» Recovery of reduced Th2 immune response in 8-CPT treated human dendritic cells by CCL2

Department of Otorhinolaryngology-Head & Neck Surgery, College of Medicine, Korea University

Byoungjae KIM, Hyun-Ji LEE, Ji-Woo YEON, JunHyung BYUN, Sang Hag LEE, Tae Hoon KIM

Objectives:A change in cAMP concentration in dendritic cells (DCs) is related to the specific type of Th differentiation. Our previous animal study showed that the decrease of cAMP in $Gnas\Delta CD11c$ mice provoked Th2 polarization and yielded a prominent allergic phenotype in

lower airway. In this study, we aimed to elucidate whether the results in this animal model are correlated with upper airway and human DC in patient with allergic rhinitis.

Methods:To examine the differences between non-allergic individuals and allergic rhinitis RNA sequencing was performed with DCs in human PBMCs (hPBMCs) and immunofluorescence against CD11c and BDCA1 was detected in turbinate. Human PBMCs were applied to CD14+ monocyte selection kit and monocytes were differentiated to DCs. Then, cAMP of DCs was detected with ELISA and CCL2 was evaluated by real time PCR and ELISA. For the functional study, to elevate cAMP concentration in DC, DCs were treated with forskolin or 8-CPT after matured with Der p1 allergen or LPS. And then they were co-cultured with CD4+ naïve T cell with or without CCL2 and IL-4 were analyzed using ELISA.

Results:In human allergic rhinitis patients, CD11c and BDCA1 stained DCs in turbinate were increased. In addition, CCL2 mRNA in DCs from hPBMCs of allergic rhinitis patients were statistically increased compared to non-allergic individuals, which was reversely related with endogenous and exogenous cAMP concentration in DCs. When 8-CPT-treated DCs were co-cultured with naïve T cells, IL-4 was decreased compared to that of non-treated DCs. This reduction of IL-4 was recovered partially by addition of CCL2 during co-culture.

Conclusions:The present study showed that elevated cAMP in human DCs reduced Th2 immunity and addition of CCL2 partially recovered Th2 immune response, which suggests the negative effect of cAMP on Th2 immune response through decrease of CCL2. However, because the activity of CCL2 did not fully explain the cAMP-related Th2 response in DCs, further studies will be needed.

» **RHOP-32 17:10~17:20**

» Virtual reality tool for sinus anatomy education; a preliminary study

¹Department of Otorhinolaryngology-Head and Neck Surgery, Sungkyunkwan University School of

Medicine, Samsung Changwon Hospital, ²Virtual Reality Laboratory, Samsung Changwon Hospital
Yong GI JUNG^{1,2}, Jung-Yon KO²

Objectives:Paranasal sinuses are very complex structures, and there is a difference in structure between individuals. Although the structure of the sinus of each patient can be grasped through CT images, it is not easy to reconstruct two-dimensional CT images into 3-D images in mind. We reconstructed the actual patient's sinus using virtual reality technology, which has recently been spotlighted, and made it easier for beginners to understand the structure of the sinus.

Methods:DICOM (Digital Imaging and Communications in Medicine) data of 0.6- 0.8mm slice thickness was extracted from the original CT image of the patient, and reconstructed 3-dimensionally using 3D modeling software. Then reconstruction and surface texturing were performed to apply 3D data to HMD(Head Mounted Display), and marking was performed on surface anatomy so that important structures can be easily identified. After reconstructed images were mounted on HMDs, they were applied to intern physicians with insufficient knowledge of sinus anatomy.

Results:The paranasal sinuses (maxillary, and sphenoid sinus) and nasal cavities of 4 real patients were successfully reconstructed in to 3D model, and the model were mounted on the HMD. All of the users reported that they had a great help in understanding the structure of the sinus, and they understood the structure to be much easier than when using CT.

Conclusions:The virtual sinus is a 3-D virtual reality model of the paranasal sinus that is accurate and easy to use. Using this model, the instructor can educate the structure of the sinuses very efficiently, and more complex and elaborate models can be equipped with more anatomical information. In addition, by creating an interactive model and adding an input device, the virtual reality model can be transformed into surgical simulator

» **RHOP-33 17:20~17:30**

» The effect of olfactory training in patients with post infectious olfactory dysfunction

Department of Otorhinolaryngology-Head and Neck Surgery, Konkuk University School of Medicine
Hyunjoo NAHM, Youngsoo YANG, Seongjun CHOI, Kyujin HAN, Seok-Chan HONG, Jae Hoon CHO, Jin Kook KIM

Objectives:Upper respiratory infection(URI) is thought to be one of the most common causes of olfactory dysfunction. Various treatment methods such as medication and surgical treatment have been attempted to treat olfactory dysfunction but there are not many proven treatment. Olfactory training has been studied as a new treatment method, and it has been reported that it may be effective. The purpose of this study was to evaluate the therapeutic effect of olfactory training.

Methods:We studied 29 patients who receive olfactory training and 22 patients who did not. All patients underwent a KVSSII test at the first visit and follow up test and the study was conducted using a custom-devised olfactory training kit.

Results:The follow up KVSSII score increased ($p<0.05$) in both the olfactory training group and the non-olfactory training group. ($p<0.05$) When analyzing the KVSSII scores of the olfactory training group, the threshold test score improved the most, but there was no statistical difference ($P = 0.057$). In the group with significantly improved KVSSII score($>\Delta 5.5$), the score of the identification test showed statistically significant improvement($P = 0.046$). Among the factors related to KVSSII score change, there was only a correlation between initial KVSSII. ($P = 0.001$)

Conclusions:It is thought that the olfactory dysfunction occurring immediately after URI is caused by nasal obstruction, but olfactory dysfunction persisting after URI recovery, maybe thought to be caused by sensorineural olfactory dysfunction. The improvement of the identification score in patients with clinical improvement

of KVSSII can be explained by the recovery of the olfactory epithelium and olfactory globe. In addition, the higher the initial KVSSII score, the more significant the change in KVSSII score after the treatment. Therefore, patients with lesser severity of olfactory dysfunction can be expected with better prognosis can be expected through active treatment including olfactory training.

» **RHOP-34 17:30~17:40**

» Olfactory function in patients with chronic rhinosinusitis before and after functional endoscopic sinus surgery

Otorhinolaryngology Dep., Kasr Alainy Teaching Hosp., Faculty of medicine, Cairo Univ.

Ehab Abo ZAED, MD, Khaled AZOOZ, MD, Ahmed EL BATAWI, MD, Mostafa EISSA

Objectives:Olfaction plays important roles in taste, warning of danger, and the triggering of emotions and memories. As per estimates available, 61% to 69% of Patients with Chronic rhinosinusitis have a reduced sense of smell. The aim of this work is to estimate the olfactory dysfunction in patients with chronic rhinosinusitis, and then evaluate whether functional endoscopic sinus surgery (FESS) significantly altered olfactory function, as measured by tests of odor identification, detection and discrimination like Sniffin Sticks test.

Methods:This study included 40 patients indicated for functional endoscopic sinus surgery due to chronic rhinosinusitis resistant to medical treatment with hyposmia or anosmia. Olfactory function evaluation was done pre and post operative through subjective and objective tests (by questionnaire and Sniffin Sticks Test).

Results:Through 40 patients with male/female (24/16). The olfaction in 37 patients was improved (37/40) and remained the same as pre-operative in 3 patients (i.e thirteen patients were improved to complete ability of smell, seventeen patients were improved to most of time good sense of smell, four patients were improved to

sometime no smell, three patients were improved from no smell to most of time no smell).

Conclusions:FESS for the chronic rhinosinusitis cases resistant to medical treatment with doing good postoperative care has good impact on the outcome results of olfaction and its improvement

» **RHOP-35 17:40~17:50**

» Predicting bacteria causing acute bacterial rhinosinusitis by clinical features

¹Dep. of Otolaryngology, Faculty of Medicine, Chulalongkorn Univ., Thailand, ²Dep. of Otolaryngology, Sawan Pracharak Hosp., Thailand, ³Dep. of Otolaryngology, Nakhon Pathom Hosp., Thailand

Dussawan SUWANWONG¹, Kachorn SERESIRIKACHORN¹, Songklot AEUMJATURAPAT¹, Supinda CHUKSAKUL¹, Jesada KANJANAUMPORN¹, Wirach CHITSUTHIPAKORN², Winyu RUKSAKUL³, Kornkiat SNIDVONGS¹

Objectives:Antibiotics should not be routinely given to acute rhinosinusitis (ARS). Narrow-spectrum antibiotics against the likely pathogens should be prescribed when needed. Drug resistant *S. Pneumoniae* and *H. Influenzae* have different mechanisms and require different antibiotics. However, microbiology studies are not practical. The Clinicians judgement should rely on clinical features to select the most appropriate antibiotics. The aim of this study are 1)To assess the correlation between type of causative bacteria and clinical features in patients with acute bacterial rhinosinusitis. 2)To predict *Streptococcus pneumoniae* rhinosinusitis, and *Haemophilus influenzae* rhinosinusitis by clinical features.

Methods:This was a cross-sectional study of 64 participants with ABRS who were prospectively recruited. Clinical features were collected including discolored nasal discharge, facial pain, nasal obstruction, smell disturbance, fever,

double sickening, symptom lasting more than 10 days. We collected serum for C reactive protein (CRP) and erythrocyte sedimentation rate determination. Middle meatal swab cultures were collected endoscopically. Correlations between clinical features and identified bacteria were analyzed.

Results:Sixty-four patients with ABRS (age 43.414.8 years, 64% female) were enrolled. Serum CRP level elevation correlated with the type of pathogen ($p=0.03$) which was increased in 80.0% of HI infection and 57.1% of SP infection. Patients with SP infection had greater prevalence of facial pain (100%) when compared to HI infection (40%), $p=0.01$.

Conclusions:Presence of facial pain and elevation of serum CRP level predict causative bacteria for ABRS. Antibiotics should be prescribed when serum CRP level is elevated. High dose amoxicillin for treating SP infection may be given when facial pain is present.

HNKL I

RM 4-3 (Convention C)
Chair : Phil Sang CHUNG

Keynote Lecture

» 10:30~11:00

» Influence of tumor heterogeneity in head and neck squamous cell carcinoma on host immune response

*Dep. of Otolaryngology, Stanford University School of
Medicine*

John B SUNWOO

While immunotherapy such as immune checkpoint blocking antibody therapy has proven to have profound clinical responses in some cancer patients, the overall response in patients with head and neck squamous cell carcinoma (HNSCC) patients is less than 25%. One major determinant of response appears to be the degree to which activated CD8+ infiltrate the tumor microenvironment. The heterogeneity of immune 'hot' and immune 'cold' tumors among the population of patients with HNSCC has been documented in multiple studies; however, mechanisms underlying the regulation of immune cell infiltration are not well-understood. Furthermore, some immune 'cold' tumors can become inflamed after immune checkpoint blockade, while others do not, and the ability to predict these responses is currently very limited. Our previous work has demonstrated that HNSCC can be subdivided into five subgroups based on their genome-wide DNA methylation patterns and RNA expression. Further, the subgroups have different degrees to which immune cells infiltrate them, with one subgroup in particular having the lowest immune cell infiltration signature. This lecture will discuss both intratumor heterogeneity and heterogeneity between tumors, and how this affects immune responses.

HNKL II

RM 4-3 (Convention C)
Chair : Eun Chang CHOI

Keynote Lecture

» 11:00~11:30

» Laryngotracheal reconstruction after the surgery of invasive thyroid cancer

*Dept. of Otorhinolaryngology-Head and Neck Surgery,
Kaohsiung Veterans General Hosp., Kaohsiung,
Taiwan (R.O.C.)*

Yaoh-Shiang LIN

The relatively benign nature of well-differentiated carcinoma of thyroid has led to the misconception that incomplete resection of the tumor may be adequate treatment when complete resection would be difficult or require violation of a nearby vital structure. In patient who eventually die of thyroid carcinoma, local recurrence with invasion of vital structures and distant metastasis have been shown to be the major causes of death and the most common postmortem finding. Hence, in case of well-differentiated thyroid cancer, radical excision of laryngotracheal invasion following by laryngotracheal reconstruction, are essential to decrease the rate of local recurrent and restore the normal function of the airway, voice and swallowing. In this talk, I'll introduce the different techniques I have used to reconstitute the laryngotracheal tract and restore the laryngotracheal function after the extirpation of invasive thyroid carcinoma.

HNSP I

RM 4-3 (Convention C)

Chair : Bee See GOH, Dong Il SUN

Recent Advancement of Airway Management

» **11:30~11:45**

» **Airway foreign body in children**

*Department of Otorhinolaryngology-Head & Neck
Surgery, Pusan National University School of
Medicine, Pusan National University Yangsan Hospital*
Jin-Choon LEE

Inhaling and ingesting foreign bodies is a major cause of unintended injuries to children under 1 year of age. Infants have poor ability to chew and squeeze food, and when the food is swallowed, the rise of the larynx and the closing of the glottis are immature. In addition, there is a habit of putting anything into the mouth of a child, and often laughing or crying while eating, so that the foreign body is likely to be sucked into the airway. Foreign body aspiration is more common in boys and children under 3 years of age. Inhaled foreign bodies are commonly found in nuts, seeds, vegetable matter or dried fruits. When aspirated, they are often lodged in the bronchial tree. The obstruction of the right main bronchus is more common because of the wider lumen and more vertical pathways. Children may experience symptoms after the choking event seen by their parents. Most common Initial symptoms vary depending on the location of the foreign body and including coughing, choking, gagging, stridor, wheezing, and shortness of breath. If there is no observed aspiration, delayed treatment or misdiagnosis may occur. As a result, subacute and chronic airway foreign bodies can cause subsequent complications, including pneumonia, lung abscess or atelectasis. Posteroanterior and lateral chest radiographs remain the first imaging study of choice for any child undergoing consideration for foreign body aspiration.

The sensitivity and specificity of chest radiography in identifying an aspirated FB are about 60% and 75%, respectively. Computed tomography has a slightly higher sensitivity but is not considered the initial line of imaging due to high cost and radiation exposure. A thorough evaluation should give the doctor an idea of the type of foreign body, its location, and the duration of the capture of the foreign object. Organic materials can be particularly difficult to remove because they can absorb body fluids and cause swelling of airway. Oils found in nuts can irritate the surrounding inflammation. Tracheal foreign objects require more urgent intervention than bronchial foreign bodies. Because the former is more likely to cause complete airway obstruction. The prevalence of trachea and larynx is low and more than 80% is actually found in the bronchi. Preparing is important for ensuring a successful rigid bronchoscopy. Before the induction of general anesthesia, the ideal sized laryngoscopes and bronchoscopes for the patient age and all associated equipment should be prepared. Care must be taken to avoid premature release of this foreign body due to blocking the airway. To make sure there are no other foreign objects, repeated bronchoscopy must be performed. After uncomplicated foreign body extraction, the patient should be observed for several hours. Patients can need to stay in the pediatric intensive care unit in the case of complicated procedures. In conclusion, size, shape and location of foreign body Impact symptoms and clinical symptoms. Airway foreign bodies require immediate diagnosis and management because diagnostic delay can cause severe complications. Rigid bronchoscopy under general anesthesia is the most widely used diagnostic and therapeutic intervention.

» 11:45~12:00

» Laryngomalacia who will benefits from surgery

*Dep. of Otorhinolaryngology- Head and Neck
Surgery, The National University of Malaysia (UKM),
Kuala Lumpur*
Bee See GOH

The commonest cause of stridor in children is laryngomalacia which usually resolved with conservative management by 2 years old. However, a small percentage of cases struggle with breathing, feeding and gaining weight hence require surgical intervention. There were 2 retrospective studies done at Universiti Kebangsaan Malaysia Medical Centre (UKMMC). The first was from 1998 til 2008 (10 procedures) with mean age of supraglottoplasty was 15.6 months (range: 2-39). The most common indication for surgery was severe stridor resulting in failure to thrive. Post operatively one patient required tracheostomy due to other medical issues. The second study was from 2009 and December 2017 (24 patients). The mean age was 9.4 months (range: 0.7-36.5), Secondary airway lesions include vocal cord palsy, laryngeal cleft, choanal atresia, vallecular cyst, and accessory larynx that were present in 16.7% of cases. The most common comorbidities were failure to thrive (45.8%), gastroesophageal reflux disease (25.0%), and congenital heart disease (16.7%). No tracheostomy was done for all these supraglottoplasty patients. Half of the patients had complete resolution of stridor within a month while the rest had partial resolution. In conclusion, patients who will benefit most are those with severe laryngomalacia that is uncomplicated by neurological conditions or multiple medical problems.

» 12:00~12:15

» Tracheal resection and end to end anastomosis

*Department of Otorhinolaryngology-Head and Neck
Surgery, Asan Medical Center, University of Ulsan*

College of Medicine

Seung-Ho CHOI

Tracheal resection and end-to-end anastomosis (TREE) is a surgical technique which resects a diseased tracheal segment and connects both ends of tracheal stumps. TREE is a choice to treat tracheal stenosis which cannot be corrected by endoscopic management or tumors arising from trachea or invading the trachea. The surgical technique is relatively simple, but unless this technique is properly used, irreversibly disastrous condition or mortality can be resulted. In this lecture, anatomy, surgical principle, indication and contraindication, preoperative evaluation, and postoperative care of TREE will be discussed.

» 12:15~12:30

» Tissue engineered tracheal reconstruction

Seoul National University Hospital
Seong Keun KWON

There are no universally effective solutions for the treatment of advanced structural disorders of the large airways in children. Although slide tracheoplasty is the primary treatment of choice for some children, others develop recurrent stenoses. Stent erosion and death can occur. In the past decade, tissue-engineered structures repopulated with cells or stem cells have been tried. The potential clinical advantages of autologous stem-cell-derived transplants are that patients who receive them would not need immunosuppression and that the transplants are hypothesized to be remodelled by local stroma to simulate native tissue. By contrast, allo-transplantation is associated with significant long-term mortality due to infection and immunosuppression, especially in the respiratory system. There is also a paucity of donors for transplantation. Thus, there is a significant unmet need for novel methods of replacing and regenerating human tissue. The ideal endpoints for tracheal replacement in children are normal airway and lung function, appropriate growth, high quality

of life, and the elimination of the need for repeated surgical interventions. Here I describe the series of my own studies on the tracheal regeneration using stem cell, 3D printed scaffold, Bioreactors, Drugs to decrease the restenosis, and the bioabsorbable stent.

HNSP II

RM 3-3 (Diamond)

Chair : Chung-Hwan BAEK, Phakdee SANNIKORN

**Reconstruction and Restoration
in Head and Neck**

» **15:50-16:05**

» **Clinical application of 3D bioprinting on
craniofacial reconstruction**

*Department of Plastic & Reconstructive Surgery,
Seoul St. Mary Hospital, College of Medicine, The
Catholic University of Korea*
Jong-Won RHIE

Management of significant facial bone defects or asymmetry are challenging. Conventional options include autogenous bone grafts or alloplastic implants. However bone grafts are limited by donor morbidity, unpredictable results and long operation time. Alloplastic implants are mainly non-absorbable and may cause foreign body reaction. We present the application of a 3D-printed patient specific absorbable mesh implant for reconstruction of bone defect caused by tumor resection. We have experienced 5 more clinical case of craniofacial reconstruction with patient specific 3D printed implant. A 3D skull model and patient specific absorbable mesh implant using polycaprolactone and /or triphosphate calcium (TCP) was produced based on CT images. 3D printed patient specific absorbable mesh implants may be the answer to complex bone defects of the facial region. We hope the subperiosteal location of this implant will induce osteogenesis and bony replacement. In

this session, I will introduce the detailed case presentation and discuss their difficult problem on the long-term follow up.

» **16:05-16:25**

» **Reconstruction procedure for functional
restoration in oral cavity cancer surgery**

*Department of Otolaryngology Head and Neck
Surgery, Rajavithi Hospital, Ministry of Public
Health, Bangkok.*
Phakdee SANNIKORN

The restoration of function following ablative surgery for head and neck carcinoma is one of the great challenges that remains for head and neck reconstructive surgeons. The head and neck area includes both static and dynamic structures and contains organs of special functions such as the nose, the ears, lips and orbital contents including the eyelids. Mandible have a very specialised function and therefore have unique reconstructive options. Soft tissue of head and neck are also unique and provide external cover, internal mucosa and facial animation. There are also mucosa-lined cavity which all lead into the aerodigestive tract. Within the most, there is another even more specialised organ, the tongue which is vital to the functions of speech and swallowing. It is now widely accepted the fibula is the gold Standard for mandibular reconstruction, the fibula has good bone stock, the capacity for multiple osteotomies to facilitate accurate shaping and reliable skin paddle. For soft tissue reconstruction, radial forearm flap has, in the past been the most widely used flap for reconstruction of oral cavity. Anterolateral thigh flap has been supplanted radial forearm flap, it has a long and larger caliber pedicle and donor site is superior to that of the radial forearm flap. The advantage and disadvantage of each flaps reconstruction will be discussed.

» 16:25-16:40

» Evidence-based application of medical procedures to improve the survival of microvascular flaps

*Department of Otolaryngology, Ajou University School
of Medicine*

Yoo Seob SHIN

Despite a remarkable expansion of free-flap reconstructive surgery in head and neck region, flap failure is still happening & threatening patients' successful recovery. Variable pharmacological agents including aspirin, heparin (low-molecular-weight and unfractionated heparin) or colloids (hydroxyphenylacetate) have been utilized to minimize risk of flap failure caused by thrombosis. However, there is no definite consensus about routinely used prophylactic antithrombotic agents, yet. The challenge of most antithrombotic therapy lies in providing patients with optimal antithrombotic prophylaxis without adverse bleeding effects. A clear evidence for the clinical benefit of an ideal administration regimen or one agent over the other has not yet been established. Although randomized controlled studies would be required.

» 16:40-17:00

» Reconstruction of pharyngo-esophagectomy defects

The University of Hong Kong

Jimmy Yu Wai CHAN

Reconstruction of pharyngo-esophagectomy defects after tumour extirpation is challenging. The aim of reconstruction is to facilitate wound healing with minimal risk of complications such as pharyngo-cutaneous fistula. In the long term, the reconstructed neopharynx should allow unrestricted passage of food and no adverse effect on speech rehabilitation. Popular choice of flap include skin flaps, such as the pectoralis major myocutaneous flap and

the free anterolateral thigh flap, as well as visceral flaps, such as the free jejunal graft. Study showed that free jejunal graft is superior to skin flaps with significantly lower risk of early leakage and late stricture formation. Donor site morbidities are uncommon, although potentially serious. Studu also showed that the free jejunal graft tolerate post-operative adjuvant radiotherapy well. In suitable patients, free jejunal graft is the preferable choice for the reconstruction of pharyngo-esophageal defects.

» 17:00-17:20

» Functional sequalea of the head and neck cancer treatment

ENT Dep. of the Comenius University and Univ. Hosp.

Bratislava, Slovakia

Miroslav TEDLA

Malignant tumours are frequent in the head and neck region. Head and Neck cancer is the sixth most common cancer worldwide with geographical differences. In later decades, there is an increase in incidence in previously unaffected populations as middle aged non smoker non drinker individuals with oral or oropharyngeal HPV related cancers. Treatment of head and neck cancer is complex and usually involves single modality therapy or a combination of surgery, radiotherapy and chemotherapy. Each of these has specific treatment-related side effects, some of them longlasting. Malignant tumour itself, together with the unfavourable effects of treatment, have an adverse impact on patients' welfare and quality of life. Most frequently reported and chronic symptoms include dysphagia, dry mouth, disordered sense of taste, voice and speech disorders, trismus, neurological impairment, chronic pain and changed appearance. The severity of symptoms, and their impact on both the functional status of the patient and their quality of life can be measured using various objective tools or subjective questionnaires. Overview of our work on functional sequalea of head and neck cancer treatment is presented. Late sequelae after head

and neck cancer treatment are frequently present and not well tolerated by many patients. However, these residual effects remain manageable with compensatory strategies for months or even years after curative treatment has been completed. New developments in treatment modalities together with extensive research in the field of quality of life in the population of head and neck cancer patients will certainly lead to an improvement in both organ function and quality of life in this population.

HNPDI

RM 4-3 (Convention C)

Chair : Min Sik KIM, Sheng Po HAO

**Panel Discussion: Salvage Treatment
of Recurred Oral Cavity Cancer**

» **13:30-13:45**

» **New staging system in oral cavity cancer**

*Department of Otorhinolaryngology-Head and Neck
Surgery, Korea University College of Medicine*

Jaegu CHO

The TNM system is an established tool for classification of solid tumors by means of tumor size and extent, the involvement of local lymph nodes, and the presence of distant metastases. The classification was established in order to visualize prognostic implications and to allow establishment of systematic therapeutic algorithms. Since the beginning of 2017 a revised version of the classification has applied. Particularly the classification of otorhinolaryngologic tumors has been thoroughly revised in the 8th edition, partly on the basis of new prognostically relevant parameters, such as infection with oncogenic human papillomavirus (HPV) subtypes. The 8th edition of the American Joint Committee on Cancer (AJCC) served as a basis for the review. The highlighted changes were supplemented by a literature review and the most important elements were summarized. Substantial changes were made for oropharyngeal carcinomas caused by HPV, for the classification of lymph node metastases under consideration of extranodal extension, and for classification of tumors of the oral cavity. Due to their frequency and special biology, skin tumors in the head and neck area are now described in a separate chapter. The new classification is a challenge for all specialties involved in tumor staging and therapy. The advantage for the patient lies in a more accurately adjustable treatment modality through more precise classification of tumors. Good collaboration and rapid implementation of

the new classification is required in all disciplines involved in head neck tumor diagnostics and therapy.

» 13:45-14:00

» Surgical approach for salvage surgery in cases of recurrent oral cavity cancer

*Dep. of Head and Neck Surgery, National Cancer
Center Hosp., Japan*
Seiichi YOSHIMOTO

In salvage procedures for treatment of recurrent oral cavity cancer, resectability is the most important factor affecting curability. Therefore, surgeons should be familiar with a range of surgical techniques. For patients who have not received radiotherapy as the first-line treatment, radical resection should be performed followed by postoperative radiotherapy (PORT). For those who have already received radiotherapy, a more radical resection is needed in the irradiated field. In such cases, salvage is often difficult from technical and oncological aspects. In a salvage setting, aggressive treatment should always be the priority and saving function should be the next consideration. Sometimes the mandibular and maxillary bones have to be resected partially or extensively. Occasionally, the platysma muscle, or overlying skin, is resected. The hyoid bone and strap muscle may be removed under some circumstances. In the case of submandibular recurrence, frequently, the hypoglossal nerve cannot be salvaged. The lower portion of the parotid gland and lower branch of the facial nerve should be resected if necessary. Partial laryngectomy or resection of the lateral wall of the oropharynx is sometimes required. The most challenging region is the infratemporal fossa, particularly around the V3 nerve, which should be cut at the region found pathologically negative by frozen section analysis. Although bone reconstruction is not indicated for many cases, a free flap is often essential, and suitable recipient vessels are necessary for microvascular anastomosis, which often requires extending the dissection to previously undissected areas of the neck. All patients

are instructed to undergo PORT as soon as possible. For patients requiring considerable time for swallowing rehabilitation, priority should be given to PORT with percutaneous endoscopic gastrostomy. For this reason, total laryngectomy is indicated in some cases. Herein, I discuss the surgical approach recommended for recurrent oral cavity cancer including some examples from our experience.

» 14:00-14:15

» Salvage neck management for locoregional recurrence

Fu-Jen Univ., SKH, Dept ENT
Sheng Po HAO

Patients with head and neck squamous cell carcinoma are usually treated with single modality(surgery or RT) or combined treatment(surgery with RT/CCRT). However, a number of cases still recur with various extent. Management of locoregional recurrence is always challenging and there is no cookbook specifically for the salvage management of the neck. The salvage management of the neck should be based on the 1. the extent of the locoregional recurrence, specifically based on PET-CT findings 2. avoid surgery if the neck recurrence is within the previous neck dissection field 3. shift to different treatment modality, for example, avoid surgery if the neck has been violated, avoid RT if the neck has been irradiated 4. not every case should undergo complete ND, superselective ND can be considered in a single node recurrence out of previous RT/CCRT. 5. consider tumor biology, discuss in the tumor board and especially review the reasons behind the recurrence thoroughly before any major decisions.

» 14:15-14:30

» Functional reconstruction for recurred cases

Seoul National University Hospital
Soon-Hyun AHN

Reconstruction in recurred oral cavity cancer is not different in basic concept with primary reconstruction. However, most recurred cases will be found with advanced disease and needs reconstruction for composite structures. The reconstruction of soft tissue only even with total glossectomy cases could be performed with anterolateral thigh flap in most cases with enough volume. For the bony reconstruction, fibular can be good choice in most cases, but due to the shortage of soft tissue volume, simultaneous two flap is required in sometimes. In this case, scapular and parascapular flap with latissimus dorsi flap can be another option. This flap can be harvested with one pedicle with large bore vessels which has compatible size with external carotid artery itself. Although, the needs of position change is the drawback, various component transferred by one pedicle is a great advantage in salvage cases with few available recipient vessel. The evaluation of remaining vessels is important for planning reconstruction. The intact internal jugular vein is important for vein anastomosis, and if the jugular vein can be dissected caudally to the digastric tendon, end-to-side anastomosis is possible. If internal jugular vein is sacrificed in previous operation, vein graft will be required to use contralateral side vein. In generally, if oropharyngeal structures are saved adequately, aggressive resection and reconstruction gives an acceptable functional result. In most cases.

HNOP I

RM 4-3 (Convention C)

Chair : Chul-Ho KIM, Kee Hwan KWON

Cancer research I

» **HNOP-01 08:00~08:10**

» Epidermal growth factor receptor in head and neck squamous cell carcinoma derived exosomes

*Department of Otorhinolaryngology-Head and Neck
Surgery, Korea University College of Medicine*

**Young Min PARK, Yoon Young GO, Jae-gu
CHO, Jeong-Soo WOO, Jae-Jun SONG**

Objectives:Exosomes secreted from cancer cells contain membrane-associated growth factor receptors such as epidermal growth factor receptor involved in cellular proliferation, but its exact role has still unknown. The aim of this study was to establish the isolation technique of exosome and to identify the presence of exosome and epidermal growth factor receptor in exosomes originated from head and neck squamous cell carcinoma.

Methods:Head and neck squamous carcinoma cell lines (FaDu and SNU-899) was used to isolate the exosomes. Xenograft animal model was made by injecting with FaDu and SNU-899 cell lines and the exosomes was isolated by using immunocapture assay from the blood samples of xenograft model and head and neck cancer patients.

Results:In the exosome, ALIX, CD9 and HSP70 were expressed on western analysis, but the calnexin which is negative marker of exosome was not expressed. The exosome isolated from head and neck cancer cell line was analyzed by transmission electron microscopy, and a specific cup-shape structure of exosome was observed. The NanoSightTM particle tracking analysis confirmed that the size of these exosomes were 50-100 nm. Full-length 170 kDa EGFR was observed in the whole cell lysate and the exosome of head and neck cancer cells on

western blot analysis. In head and neck cancer xenograft model, we changed the isolation technique of exosome into immunocapture assay with CD44 antibody. The expression of epidermal growth factor receptor was analyzed by western blot analysis after the isolation of exosome using immunocapture assay with CD44 antibody from the blood of xenograft model and patients. The expression of exosome markers such as CD63 and ALIX was confirmed and the expression of epidermal growth factor receptor in exosomes was confirmed on western blot analysis. No significant difference was observed in the expression level of EGFR on western blot analysis according to tumor volume.

Conclusions: We confirmed the presence of exosome and EGFR in exosomes secreted from head and neck squamous cell carcinoma. However, more exquisite isolation method and quantitative assay of exosome should be established and the role of exosomal EGFR should be investigated in the further research.

» **HNOP-02 08:10~08:20**

» Establishment and characterization of patient-derived xenografts as preclinical models for head and neck cancer

¹Department of Otorhinolaryngology, Korea University,

²Department of Otorhinolaryngology, ³Division of Medical Oncology, Yonsei University College of Medicine

Hyung Kwon BYEON¹, Da Hee KIM², Hye-Ryeon KIM³, Byung-Chul CHO³, Yoon Woo KOH²

Objectives: Recently, there has been increasing interest in the development and characterization of patient derived tumor xenograft (PDX) models for cancer research. PDX models of head and neck squamous cell carcinoma (HNSCC) have been developed previously but were not well characterized at the molecular level.

Methods: We transplanted 46 primary tumors directly into the mice. Fifteen PDXs with annotated clinical information were established from uncultured unselected

clinical head and neck squamous cell carcinoma specimens in immunodeficient NSG mice (31% success rate). The histology was analyzed by immunohistochemistry. Targeted deep sequencing and oncomine analysis were conducted on patient tumors and on PDXs.

Results: PDX models mostly retain the principal histological and genetic characteristics of their donor tumor and remain stable across passages. Targeted deep sequencing revealed that PDXs and parental patient cancers shared 88% of genetic aberrations, including multiple druggable targets. Mutations and DNA copy number alterations out of HNSCC PDXs were determined through oncomine analysis.

Conclusions: The PDX models described here show high correlation with the patient at the genomic level and known patient response to treatment. These models have been shown to be able to predict clinical outcomes and are being used for preclinical drug evaluation, biomarker identification, biological studies, and personalized medicine strategies. Rapid and efficient establishment of individual PDX models may also contribute to future personalized anticancer therapies.

» **HNOP-03 08:20~08:30**

» LAMB3 is associated with disease progression and cisplatin cytotoxic sensitivity in head and neck squamous cell carcinoma

¹Department of Medical Science, College of Medicine, Chungnam National University, Daejeon, Republic of Korea, ²Department of Otolaryngology-Head and Neck Surgery, Research Institute for Medical Science, Chungnam National University College of Medicine, Daejeon, Republic of Korea, ³Department of Pathology, Research Institute for Medical Science, Chungnam National University College of Medicine, Daejeon, Republic of Korea

Lihua LIU¹, Seung-Nam JUNG², Chan OH², Kyungmin LEE², Jae Won CHANG², Jin Man KIM³, Bon Seok KOO²

Objectives: Laminin subunit beta-3 (LAMB3) is a major component of the basement membrane zone. In our study, we investigated the role of LAMB3 in head and neck squamous cell carcinoma (HNSCC) progression and its clinical implication as a prognostic biomarker.

Methods: A retrospective analysis of 104 patients with HNSCC who had undergone curative surgery from 1999 to 2011 was performed. We evaluated LAMB3 expression by immunohistochemistry and its associations with clinicopathological characteristics and survival. For functional in vitro analyses, cell proliferation, migration, and invasion and western blot assays were performed following LAMB3 suppression. In addition, the role of LAMB3 in cisplatin-induced cytotoxicity was clarified by measuring cell proliferation.

Results: LAMB3 expression was up-regulated in HNSCC cell lines and patient tissues. High LAMB3 expression was significantly associated with positive lymph node metastasis (odds ratio: 3.804; P=0.035) and poor prognosis in patients with HNSCC. LAMB3 suppression reduced cell migration/invasion via down-regulation of epithelial-to-mesenchymal transition-associated proteins (vimentin and Slug). Moreover, LAMB3 suppression increased cisplatin cytotoxicity in HNSCC cells.

Conclusions: Our findings indicate that LAMB3 may be used as a prognostic biomarker in HNSCC and support the synergistic effect of LAMB3 inhibition and anti-cancer drugs in cancer therapy.

» **HNOP-04 08:30~08:40**

» Phosphorylation of PI3K regulatory subunit p85 contributes to resistance against PI3K inhibitors in radioresistant head and neck cancer

¹Department of otolaryngology, Ulsan University
college of Medicine, Ulsan University Hospital,

²GangNeung Asan Hospital, ³Asan Medical Center

**Myung Woul HAN¹, In Sun RYU², Jong Cheol
LEE¹, Song Hee KIM¹, Sang Yoon KIM³**

Objectives: The PI3K/Akt/mTOR pathway is commonly activated in most cancers and is correlated with resistance to anticancer therapies such as radiotherapy. Therefore, PI3K is an attractive target for treating PI3K-associated cancers.

Methods: We investigated the basal expression and expression after treatment with PI3K or Src inhibitors of PI3K/Akt pathway-related proteins in AMC-HN3, AMC-HN3R, HN30, and HN31 cells via immunoblot analysis. The sensitivity to PI3K or Src inhibitors was analyzed via MTT and clonogenic assays. Furthermore, we used a xenograft mouse model to determine the antitumoral activity of the PI3K and Src inhibitor combination treatment.

Results: We found that the PI3K regulatory subunit, p85, was predominantly phosphorylated in the radioresistant head and neck cancer cell line HN31, which showed resistance to PI3K inhibitors. Next, we investigated the mechanism through which PI3K p85 phosphorylation modulated the response to PI3K inhibitors. Notably, the constitutive activation of Src was observed in HN31 cells, along with the restoration of p-Src upon PI3K inhibitor treatment. The Src inhibitor improved the efficacy of the PI3K inhibitor treatment and suppressed the reactivation of both Src and PI3K p85 in HN31 cells. Furthermore, downregulation of the PI3K p85 expression by using a specific siRNA suppressed Src phosphorylation.

Conclusions: Cumulatively, our results indicate the novel role of the PI3K regulatory subunit, p85, in the development of resistance to PI3K inhibitors and suggest the presence of a regulatory loop between PI3K p85 and Src in radioresistant head and neck cancers with a constitutively active PI3K/Akt pathway.

» **HNOP-05 08:40~08:50**

» C1SD2 overexpression confers resistance to sulfasalazine-induced ferroptotic cell death in head and neck cancer

Department of Otolaryngology, Asan Medical Center,
University of Ulsan College of Medicine

Eun Hye KIM, Daiha SHIN, Jaewang LEE, Jong-Lyel ROH

Objectives: Sulfasalazine, an anti-inflammatory drug, become repurposed to induce ferroptotic cancer cell death by inhibition of the xc- cystine/glutamate antiporter (xCT). Inhibition of xCT renders cancer cells susceptible to ferroptosis, a recently recognized form of iron- dependent, non-apoptotic, regulated cell death. However, cancer cells can develop mechanisms evading from cell death. We sought to find the molecular mechanism of resistance to sulfasalazine-induced ferroptosis in head and neck cancer (HNC).

Methods: The effects of sulfasalazine and pioglitazone were tested in different HNC cell lines. The effects of these drugs as well as the inhibition and overexpression of CIST2 gene were by cell viability, cell death, lipid reactive oxygen species (ROS) production, mitochondrial iron and membrane potential, protein expression, and mouse tumor xenograft models.

Results: Sulfasalazine induced ferroptotic cell death of HNC at different levels, of which sensitivity was most high in HN11 and most low in HN10. CIST2 expression was high in HN10 but low in HN11, showing association between its expression and ferroptosis resistance. CIST2 overexpression in sulfasalazine-sensitive HN11 conferred cancer cells to resistance to ferroptosis by sulfasalazine. Silencing of CIST2 gene rendered resistant HNC cells susceptible to sulfasalazine- induced ferroptosis, along with increased levels of lipid ROS and mitochondrial ferrous iron and decreased expression of NCOA4, beclin- 1, Bcl-2, and FTH1 proteins. Pioglitazone also sensitized resistant HNC cells to sulfasalazine treatment in vitro and in a mouse xenograft model transplanted with HN10.

Conclusions: CIST2 inhibition overcomes HNC resistance to ferroptotic cell death induced by sulfasalazine via increased accumulation of mitochondrial ferrous iron and lipid ROS.

HNOP II

RM 3-3 (Diamond)

Chair : Jin Hwan KIM, Soon Young KWON

Salivary gland

» **HNOP-06 08:00~08:10**

» Immunological characteristics of IgG4 related kuttners tumor

*Department of Otolaryngology-HNS, Research
Institute for Clinical Medicine of Chonbuk National
University*

Yong Tae HONG, Ki Hwan HONG

Objectives: IgG4-related disease(IgG4-RD) is recently well recognized as an chronic inflammatory disease in the head and neck region, particular in the submandibular gland(SMG). Kuttner's tumor is known as chronic sclerosing sialadenitis representing the focal manifestation of IgG4-RD. This study is to evaluate the immunologic features of IgG4 related Kuttner's tumor in the SMG.

Methods: We chose retrospectively 10 patients who confirmed as Kuttner's tumor by immunohistochemical findings after surgery. The fine needle aspiration cytology, serum antibody levels(anti-Ro antibodies, anti-La antibodies), serum IgG levels(total IgG and IgG4) and immunohistochemical findings for IgG and IgG4 positive plasma cells were reviewed.

Results: The cytologic results, of the 7 cases, 4 cases were reported as chronic sialoadenitis and benign lymphoproliferative lesion in 3 cases. The serum levels of autoantibodies, SSA/Ro-Ab and SSA/Ro-La, showed all normal values of serum level. The serum level of IgG showed an increase in only 1 case among 10 cases, and 9 cases with normal levels. However, the IgG4 levels showed significantly increases in the 9 cases among 10 patents, but not in the only 1 case. Immunohistochemical findings showed all positive results as IgG4-RD, elevated numbers

of IgG and IgG4-positive plasma cells.

Conclusions:The cytologic results, of the 7 cases, 4 cases were reported as chronic sialoadenitis and benign lymphoproliferative lesion in 3 cases. The serum levels of autoantibodies, SSA/Ro-Ab and SSA/Ro-La, showed all normal values of serum level. The serum level of IgG showed an increase in only 1 case among 10 cases, and 9 cases with normal levels. However, the IgG4 levels showed significantly increases in the 9 cases among 10 patents, but not in the only 1 case. Immunohistochemical findings showed all positive results as IgG4-RD, elevated numbers of IgG and IgG4-positive plasma cells.

» **HNOP-07 08:10~08:20**

» **Safety and advantages of robotic parotidectomy with/without neck dissection via modified facelift approach**

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²Department of Otorhinolaryngology, Gungyang University, ³Department of Otorhinolaryngology, Korea University, ⁴Department of Otorhinolaryngology, Seoul National University

Ruby ROBLES¹, Chan LEE¹, Da Hee KIM¹, Joo Hyun KIM², Hyung Kwon BYEON³, Won Shik KIM⁴, Se-Heon KIM¹, Eun Chang CHOI¹, Yoon Woo KOH¹

Objectives:We have reported the feasibility of various robotic head and neck surgery previously. Based on our experiences, we tried to apply a robotic system to the new field of head and neck surgeries. Here, we report on the technical feasibility and functional outcomes of first attempted robotic parotidectomy.

Methods:From June 2017 to January 2018, 17 patients in whom parotid tumor was diagnosed underwent robotic parotidectomy via modified facelift approach. We analyzed clinical characteristics and functional outcomes. The operation time, amount of bleeding, amount of drainage, duration of hospital stay, and postoperative complications

were reviewed.

Results:All parotid surgeries were performed with da Vinci robotic system after the elevation of retroauricular flap as in the previous method of robotic neck dissection. Thirteen patients for parotidectomy alone, three patients for parotidectomy with neck dissection, one for parotidectomy and hemithyroidectomy, were successfully accomplished. The mean total operation time was 117 ± 29.8 minutes, amount of bleeding was 20.5 ± 3.1 mL, amount of drainage was 144.3 ± 61.2 mL, and duration of hospital stay was 6.1 ± 1.5 days. None of the patients who underwent surgery had facial weakness or paralysis.

Conclusions:The robotic parotidectomy via modified facelift approach was feasible, safe, and functionally efficient. Although the surgical preparation is somewhat longer than the conventional surgery, it seems to be more effective in finding and dissecting the facial nerve with magnified surgical view and preventing postoperative sequelae.

» **HNOP-08 08:20~08:30**

» **Diagnosis and management of salivary duct stenosis using ultrasonography and sialendoscopy**

Department of Otorhinolaryngology-Head and Neck Surgery, Catholic University of Daegu, School of Medicine

Jeong Kyu KIM, Bu-Kwan KIL, Bo-Mun KIM

Objectives:We aimed to assess the ultrasonographic and sialendoscopic characteristics of salivary duct stenosis. The treatment outcomes were also analyzed

Methods:The medical records of a total of 22 patients who had been treated for salivary duct stenosis were retrospectively reviewed. Six patients had Wharton's duct stenosis and 16 patients had Stensen's duct stenosis.

Results:Ultrasonography showed salivary duct dilatation in 18 (81.8%) patients and parenchymal changes including hypoechogenicity, hypertrophy or atrophy in 10 (45.5%) patients. Sialendoscopy confirmed 26 salivary duct stenosis in 22 patients. Multiple sites of stenosis were observed in

4 (18.2%) patients. Ten (38.5%) stenosis were located in distal duct, 14 (53.8%) stenosis were located in middle duct, and 2 (7.8%) stenosis were located in proximal duct. For the treatment, sialendoscopic dilatation and cortisone application was performed in 18 patients and sialodochoplasty was performed in 4 patients. Complete resolution of symptoms were achieved in 8 (36.4%) of patients, partial improvement of symptoms were observed in 8 (36.4%) of patients, no improvement of symptoms were observed in 5 (22.7%) patients, and aggravation of symptoms were observed in 1 (4.5%) of patients in mean 7.1 months follow-up (range 0.3 - 31.3 months). Conclusions: Salivary duct stenosis could be suggested by salivary duct dilation on ultrasonography and could be diagnosed and managed using sialendoscopy with acceptable outcomes.

» **HNOP-09 08:30~08:40**

» Analysis of characteristics of the patients with grade III salivary ductal stenosis

¹Department of Otorhinolaryngology-Head and Neck Surgery, Inha University School of Medicine,

²Department of Otorhinolaryngology, Gangnam Severance Hospital, Yonsei University College of Medicine

Seung-Chan YANG¹, Ji Won KIM¹, Young-Mo KIM¹, Jae-Yol LIM², Jeong-Seok CHOI¹

Objectives: The aim of this study is to analyze clinical characteristics of grade III comparing to grade I and II salivary ductal stenosis.

Methods: Totally, 73 patients with salivary duct stenosis who underwent sialendoscopy between 2011 and 2017 were included. The patients were divided with three groups with salivary duct stenosis according to sialendoscopic findings. Clinical features, preoperative symptoms questionnaires, salivary flow rate, salivary scintigraphy, magnetic resonance (MR) sialography, postoperative patient reported outcomes were retrospectively collected and analyzed with Mann

Whitney test and Pearson Chi-square test. ANOVA of clinical features were performed between three groups.

Results: Based on sialendoscopic findings, 21 patients were classified into grade I, 27 patients with grade II, 25 patients with grade III. In grade III stenosis group, preoperative obstructive symptom score was higher than the other groups and postoperative symptom improvement was less compared to grade I+II groups ($P<0.05$). Preoperative salivary scintigraphy showed statistically significant higher T_{min} score in grade III stenosis groups compared to other groups ($P<0.05$). Intraoperative open ductal surgery tended to be more performed in grade III stenosis group ($P<0.05$). **Conclusions:** Grade III salivary ductal stenosis showed more severe clinical symptoms and poor postoperative prognosis compared to the other groups. Grade III salivary stenosis might be required more invasive techniques such as ductal surgery.

» **HNOP-10 08:40~08:50**

» Protective effects of platelet gel on radiation induced salivary gland cell damage

Department of Otorhinolaryngology-Head and Neck Surgery, Inha University School of Medicine, Incheon, Republic of Korea

Ji Won KIM, Jeong Mi KIM, Young-Mo KIM, Jeong-Seok CHOI

Objectives: Salivary gland (SG) dysfunction and xerostomia is most common complication in the patients with head and neck cancer following radiation therapy. Platelet gel is defined as autologous platelet derivatives with highly dense platelet concentration which is widely used in different areas of regenerative medicine to enhance wound healing processes. In this study, we confirmed the effect of platelet gel on radiation induced SG cell damage.

Methods: The platelets were separated from the blood of male SD rats (220±20 g) and activated with collagen (2 ug/ml) to obtain platelet gel. The proliferation rate of human primary SG cells treated with/without 5% platelet

gel was checked by CCK8. The amount of PDGF-AB, TGF- β in platelet gel, the superoxide dismutase (SOD) and amylase activity of cell supernatant were determined by ELISA. Histologic examinations, immunohistochemistry analysis with P21 and 8-OHdG, and TUNEL assay were performed.

Results: The proliferation rate of SG cells was significantly reduced by irradiation at 2 and 7 Gy. The platelet gel showed high amount of PDGF-AB, TGF- β . In radiation exposed SG cells, platelet gel treated SG cells showed the higher proliferation rate than platelet gel untreated SG cells. The SOD activity in platelet gel treated SG cells was higher than in untreated SG cells. In immunohistochemistry analysis, the expression of pP21 and 8-OHdG were decreased in the platelet gel treated SG cells compared to the untreated SG cells. In TUNEL assay, the number of apoptotic cells was markedly decreased in platelet gel treated SG cells compared to the untreated SG cells.

Conclusions: The administration of platelet gel could protect the radiation induced SG cell damage.

Objectives: The goal of our study was to explain the natural course of different degree of vocal fold paralysis (VFP) with various etiologic factors.

Methods: The study included 853 cases of VFP patients studied from November 2005 to December 2016. 16 different etiologies were classified, including 223(25.4%) idiopathic, 513(56%) post-surgical (thoracic surgery=219, thyroidectomy=222, neck surgery=50, and neurosurgery=22), 19(2.1%) central origin, 45 (4.9%) intubation related, 22(2.4%) neck trauma, and 5(0.5%) cases of arytenoid dislocation. The paralyzed side and the degree of the VFP were examined by experienced laryngologists.

Results: The initial examination revealed 256(30.0%) right, 533(62.5%) left, and 64(7.5%) bilateral vocal fold paralysis. 917 vocal folds (320 right<597 left, $p<0.05$) were utilized for further analysis. Age, gender, follow up period, severity of VFP, and recovery rate did not differ between both sides, while significantly more left VFP cases in idiopathic and thoracic surgery, and more right in cervical-spine surgery group. Follow-up showed 18.1%($n=166$) of vocal fold mobility was completely recovered within 43.55 ± 90 weeks and 10.3%($n=94$) was partially recovered within 64.24 ± 82 weeks. Additionally, the recovery rate according to etiology showed significantly different distribution with dislocation of arytenoid showing 80% recovery rate while post-neurosurgery and neck trauma showing 4.5%. 50% of VFP recovered within 45.6 weeks while no further recovery was detected after 88.7 months.

Conclusions: There was significantly more left VFP within our cohort with majority caused by idiopathic or post-thoracic surgery etiology. The recovery rate differed among etiologies and most of the VFP recover within 88.7 months.

HNOP III

RM 3-3 (Diamond)

**Chair : Ahmed Mahmoud EL-BATAWI,
Young Hak PARK**

Laryngology I

» **HNOP-11 10:30~10:40**

» Natural course of patients with vocal fold paralysis retrospective cohort review of a single institutions eleven years of experience

Department of Otorhinolaryngology-Head and Neck Surgery, Seoul National University College of Medicine
**Dong-Han LEE, Sang-Youp LEE, Minhyung LEE,
Jungirl SEOK, Sung Joon PARK, Young Ju JIN,
Doh Young LEE, Tack-Kyun KWON**

» **HNOP-12 10:40~10:50**

» Assessment of injecting saline as a preliminary testing for closure of glottal gaps

Otorhinolaryngology Dep., Kasr Alainy Teaching Hosp., Faculty of medicine, Cairo Univ.

**Ahmed S. DARDERY, MD, Hossam M. El
DESSOUKY, MD, Ahmed EL BATAWI, MD, Afaf
ISMAIL**

Objectives:Injection laryngoplasty (IL) continues to evolve as new technique, approaches and injection materials are continuously being developed. Although it was performed under general anesthesia in the operating room, IL is now increasingly being performed in an office-based setting. The aim of this prospective interventional study was to assess the injection of vocal cord by saline as a preliminary testing and evaluate functional outcomes (voice outcomes and patient satisfaction) after injection laryngoplasty.

Methods:Twenty patients were included in this study with unilateral vocal fold paralysis or patients with dyspnoea caused by glottal gaps which was resistant to medical treatment or voice therapy and will proceed to injection laryngoplasty by permanent material. Analysis using C.S.L (computerized speech lab.) to evaluate Jitter, shimmer, and harmonic to noise ratio. The IL was done under local Anesthesia using Normal saline through trans-cricothyroid membrane approach or trans thyrohyoid membrane approach.

Results:Mean age was 45.75 years (18-68y), Female to male patients (16/4), twelve patients with unilateral vocal cord paralysis post thyroidectomy or of unknown reason, the rest of patients due to vocal cord atrophy. Mean time of the procedure 25.6 minutes (15-47 min.), five patients have temporary hematoma (5/20), No patient suffered from respiratory distress due to IL, there was no complaint from any patients during the procedures, only 10 patients showed temporary voice improvement for less than 24 hours (10/20).

Conclusions:Assessment of the prospective outcomes of IL with a relatively expensive permanent injection material can be predicted preliminary by safe, quick procedure with cheap temporary material like Normal Saline which will give us a good view for this prospective outcomes and show us which patient will get benefits from the permanent injecting material.

» **HNOP-13 10:50~11:00**

» Real-time image classification during laryngoscopy using openCV haar cascade training and convolutional neural network-based deep learning

*Department of Otorhinolaryngology-Head and Neck
Surgery, University of Ulsan College of Medicine,
Asan Medical Center*
Won Ki CHO, Seung-Ho CHOI

Objectives:Deep learning using convolutional neural network (CNN) is increasingly used in the field of computerized visual recognition. Application of CNN in laryngoscopy is challenging because the video is unstable and it is difficult to focus the region of interest (ROI) that is the vocal folds (VF). Another problem is that CNN-based classification is too slow to manage the video stream in real time. This study was performed to prove the usefulness of sequential combination of ROI selection and CNN-based classification for live laryngoscopy.

Methods:For detection of ROI (open VF), openCV haar cascade training was done with 200 positive images and 606 negative images. A CNN model with 7 layers was constructed for binary classification of normal and abnormal VF. After random assignment to training, validation and test sets in the ratio of 0.6:0.2:0.2, training was performed with 1317 normal and 779 abnormal VF images. First, video stream from recorded video files or live laryngoscopy was subjected to open VF detection procedure. Subsequently, cropped images were subjected to the trained CNN model and the final decision was made by the probability as normal ($\geq 50\%$) or abnormal ($< 50\%$). For verification, this system was applied to 99 normal and 110 abnormal video files, and accuracy and predictive values were calculated.

Results:By openCV haar cascade training, open vocal folds could be successfully detected during laryngoscopy. Accuracy of the CNN model deciding normal and abnormal VFs was 93% after training. The trained CNN

model could be used without stoppage or stuttering of 60 fps video play. Mean probability for normality was 72.5% in normal group, and 25.4% in abnormal group. Accuracy was 84.7%. PPV and NPV for normality were 80.2% and 89.8%, respectively.

Conclusions:Combination of object detection by openCV and CNN-based deep learning is useful to classify normal or abnormal VF during laryngoscopy. More sophisticated CNN training model is required to improve accuracy.

» **HNOP-14 11:00~11:10**

» Long working distance OCT for phonomicrosurgery—preliminary observation of 3D microstructure of ex vivo specimens

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Objectives:Optical Coherence Tomography (OCT) is a promising non-invasive in vivo imaging technology visualizing the 3-dimensional microanatomy of retina, skin and vocal fold. In the field of laryngology, OCT probes installed in an existing laryngoscope or a microscope have been widely studied. However, there are still a number of critical issues to be resolved to develop a successful phonomicrosurgical OCT system including high-resolution, long working distance (≥ 300 mm) and rapid 3D image reconstruction, etc. Here we introduce a long working distance OCT with 30 μ m lateral and 11 μ m axial resolutions. To the best of our knowledge, this is the first OCT with up to 300 mm of working distance as well as μ m-level resolutions to identify subepithelial tissue

structure of vocal fold. The main purpose of this study is to investigate the feasibility and efficacy of the system in ex-vivo microstructure imaging of vocal fold, especially the Reinke's space.

Methods:We tested the imaging capability of the system with the rabbit eyeball, freshly excised canine larynx samples and human laryngectomized specimens. The acquired OCT images were then compared with the corresponding H&E stained histological sections.

Results:This correlation study allowed the identification of the epithelial layer and lamina propria of the canine and human specimens from both the OCT and the microscope images ensuring solid correspondence between two different types of visual tissue assessment.

Conclusions:This OCT system is developed to directly confirm the lesions during phonomicrosurgeries enabling the clinicians to reduce the number of intraoperative biopsies.

» **HNOP-15 11:10~11:20**

» Clinical practicability of a newly developed real-timedigital kymographic system

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Objectives:The purpose of the study was to validate the clinical practicability of a real-time multislice digital kymographic system developed by the authors. We analyzed the promptness and accuracy of the examination before and after intracordal injections in patients with unilateral vocal fold paralysis.

Methods:To assess the clinical applicability of this system,

six patients with unilateral vocal fold paralysis were selected. Real-time DKG was performed before and immediately after intracordal injection. We observed changes in the digital kymogram after the intracordal injection.

Results: Using this system, 10 scanning lines and up to five vertical pixel row could be obtained in real time, and the maximum acquisition time for the DKG image was 10 seconds. A digital kymogram of the patients could be instantaneously acquired, and whether the intracordal injection was appropriate or not.

Conclusions: This article is the first validation study after the development of the real-time multislice digital kymographic system. Our system may be a promising tool in clinical practice for immediate assessment of the vibratory patterns of the vocal cords. More research is necessary for further clinical validation.

» **HNOP-16 11:20~11:30**

» The factors predicting the result of voice therapy in patients with dysphonia

Department of Otolaryngology-Head and Neck surgery, Kyung Hee University Medical Center
Seok Hyun KIM, Young Chan LEE, Oh Eun KWON, Young-Gyu EUN

Objectives: The voice therapy plays an important role in patients with a voice change, regardless of the surgery. The preceding studies suggest that the voice therapy improves voice in patients with a voice change. Improvement of voice can be verified based on various indicators on voice test. The purpose of this study was to investigate the factors predicting the result of voice therapy in patients with dysphonia.

Methods: 57 patients who had voice therapy for dysphonia were included in the study. Parameters, such as Jitter, shimmer, GRBAS, F0, NHR and VHI, were selected as the indicators of voice test. 29 patients with a mean jitter change rate above the mean and a mean shimmer change rate above the mean were selected as the patient group with

higher efficiency in the voice therapy. 13 patients, on the other hand, with a mean jitter change rate below the mean and a mean shimmer change below the mean were selected as the patient group with lower efficiency. Age, Job, onset time (year), intake of coffee, vocal cord state (polyp or nodule vs MTD, presbylaryngis, or functional dysphonia) were selected as factors between two groups.

Results: In all subjects, NHR, jitter, shimmer, MPT, VHI, and GRBAS before and after treatment showed statistically significant improvement. Compared with higher efficiency group and lower efficiency group, the odd of lower efficiency group was 3.408 times if onset time increases by one year. The patients with vocal cord nodule or polyp showed better result of voice therapy (odd ratio: 0.092). If there is a factor of intake of coffee, the odd of lower efficiency group is 0.176 times compared to a factor of not-intake of coffee.

Conclusions: We suggest that onset time, vocal cord state, and intake of coffee are the factors predicting the result of voice therapy in patients with dysphonia.

HNOP IV

RM 3-3 (Diamond)

Chair : Hong-Shik CHOI, Sung Min CHUNG

Laryngology II

» **HNOP-17 11:30~11:40**

» The effect of baclofen combined with a proton pump inhibitor in patients with refractory laryngopharyngeal reflux a prospective, open-label study

Department of Otorhinolaryngology-Head and Neck Surgery, School of Medicine, Kyung Hee University
Oh Eun KWON, Ah Ra Jung, JEONG Wook KANG, Jin Hyuk HUH, Young-Gyu EUN, Young Chan LEE

Objectives: Acid suppression by proton pump inhibitors (PPIs) is currently the standard therapy for laryngopharyngeal reflux (LPR) and can improve reflux-related symptoms in the majority of patients. Unfortunately, however, some patients do not respond to PPI treatment. Baclofen, an inhibitor of transient lower esophageal sphincter relaxations (TLESRs), can suppress reflux events and is now being used in the treatment of refractory gastroesophageal reflux disease (GERD). However, the effect of baclofen in LPR patients with resistance to PPIs has not been studied. Our aim in this study was therefore to evaluate the effect of baclofen combined with a PPI in patients with refractory LPR.

Methods: Thirty-eight patients with refractory LPR confirmed by 24-hour multichannel intraluminal impedance pH (24-h MII-pH) were given a 3-month course of baclofen 10 mg three times a day combined with PPI 15 mg twice a day. Changes in reflux symptom index (RSI) and reflux-related quality of life from baseline to after treatment were evaluated. Baseline demographic factors, symptom score, and 24-h MII-pH data were compared between responders and non-responders.

Results: Thirty-two of 38 patients completed the study. MII-pH monitoring of refractory LPR patients showed that the number of non-acid reflux was much higher than acid reflux in laryngopharyngeal reflux and full-column reflux. After 3 months of PPI + baclofen medication, most RSI items and quality of life score showed a significant improvement compared to the baseline score. The percentage of responders at 1 month and 3 months after PPI + baclofen treatment was 25.0% (n=8) and 53.1% (n=17), respectively.

Conclusions: When LPR patients are unresponsive to PPI therapy, baclofen can be considered as a second treatment option to alleviate reflux symptoms.

» **HNOP-18 11:40~11:50**

» Development of attachable phonomicrosurgical OCT device-feasibility study

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Objectives: The main purpose of this study is to evaluate the feasibility of OCT system attachable to an operating microscope which can be a promising alternative method to frozen biopsies for intraoperative margin assessment.

Methods: We developed a phonomicrosurgical OCT with a long working distance and attachable to an existing operating microscope. The OCT also has a dichroic mirror which splits the coherent IR laser and visual projection to enable dual imaging. We evaluated the efficacy of the system in evaluating subepithelial tissue structure, especially in the Reinke's space of vocal fold. We tested its imaging capability with excised canine larynx, laryngectomized larynx specimen and eyeball. In addition, we compared the images with corresponding histopathologic findings to confirm the diagnostic feasibility.

Results: The OCT and histopathologic images showed a significant correlation to identify the epithelial layer and lamina propria from the OCT images.

Conclusions: This is the first OCT system attachable to an operating microscope which may provide a promising alternative to frozen biopsies for intraoperative laryngeal cancer margin assessment.

» **HNOP-19 11:50~12:00**

» An evaluation of uncertainty for voice assessment

Department of Otorhinolaryngology-Head and Neck

*Surgery, College of Medicine, Chung-Ang University
Hospital*

**Yang-Ho LEE*, Yang-Ho LEE, Hoon-Shik YANG,
Seok Chan HONG, Seun-Ah KO, Sei-Young LEE**

Objectives:The voice reflects the overall health status of a person, and an objective assessment of this is important. In recent years, interest in human body measurement has been increasing, and uncertainty must be evaluated to ensure accurate measurement and reliability. In this study, Speech analysis was performed and the uncertainty factors were determined for the Fundamental Frequency, Jitter, Shimmer and HNR values and the combined uncertainty was calculated.

Methods:The uncertainty of microphone in calibration certificate (Type B), the uncertainty due to the resolution (Type B) and the uncertainty of the repeatability of the test obtained by performing 10 tests on one normal male adult (Type A) were included in calculating combined standard uncertainty. **Results:** The uncertainties were found to be 0.620, 0.011, 0.090, and 0.451 for the Fundamental Frequency, Jitter, Shimmer, and HNR, respectively.

Results:The uncertainties were found to be 0.620, 0.011, 0.090, and 0.451 for the Fundamental Frequency, Jitter, Shimmer, and HNR, respectively.

Conclusions:This is the first study to analyze the uncertainty of voice test. More studies should be conducted on a wider variety of people.

» **HNOP-20 12:00~12:10**

» **Efficacy of two-dimensional scanning digital kymography in evaluation of atrophic vocal folds**

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In-Ho BAE¹, Min-Sik KIM², Soo-Geun WANG²,

**Jin-Choon LEE², Byung-Joo LEE², Won-Jae
CHA², Eui-Suk SUNG², Seong-Tae KIM³**

Objectives:The purpose of this study was to evaluate the clinical feasibility and diagnostic accuracy of two-dimensional scanning digital kymography (2D DKG) in patients with vocal cord atrophy before and after treatment.

Methods:We analyzed the characteristics of vocal fold vibration in 5 patients with unilateral vocal fold paralysis and 5 patients with presbyphonia. In patients with vocal cord paralysis, the status before and after intracordal injection was compared. Furthermore, in patients with presbyphonia, we compared the status before and after voice therapy (Seong-Tae Kim's laryngeal calibration technique). Quantitative parameters such as amplitude and phase symmetry indices, jitter, shimmer, noise-to-harmonic ratio, and maximum phonation time and qualitative parameters such as voice handicap index, glottal gap, amplitude, and phase difference were used to evaluate the pre- and post-treatment status.

Results:In cases of vocal cord paralysis, vibratory changes of the vocal folds before and after intracordal injection could be identified immediately using 2D DKG. In over-correction cases, all of the measured parameters were poor except for improvement of the glottal gap. In addition, 2D DKG showed appropriately the changes in vocal cord vibration before and after voice therapy in patients with presbyphonia.

Conclusions:2D DKG may be a useful for evaluating the vibratory characteristics of the entire vocal cords, and the results of treatment for patients with vocal cord atrophy can be identified instantaneously. It allows clinicians to easily assess the left-right phase symmetry and amplitude symmetry, as well as could demonstrate age-related variations of vocal folds. Therefore, this system is expected to be a promising diagnostic tool to evaluate subtle changes of vocal fold vibration. In addition, it also may play a role in providing a decision for treatment modalities.

» **HNOP-21 12:10~12:20**

» **Acoustic characteristics of muscle tension dysphonia patients and clinical usefulness of the spectral and cepstral index of dysphonia**

Department of Otorhinolaryngology-Head and Neck Surgery, Kangbuk Samsung Hospital, Sungkyunkwan University School of Medicine

Seung Ho NOH, Sang Hyuk LEE, Jae Kyung CHO, Sung Min JIN

Objectives: Muscle tension dysphonia(MTD) is classified as functional voice disorder and acoustic features of MTD patient have high jitter, shimmer, noise to harmonic ratio(NHR) and low fundamental frequency than normal group. The cepstral and spectral index of dysphonia(CSID) quantifies the level of voice abnormality and derived from the cepstral peak prominence(CPP), L/H ratio, and sex information through weighted multiple regression. Unfortunately there are few study demonstrating the clinical usefulness of CSID. The purpose of this study was to analyze acoustic parameters and demonstrate the clinical usefulness of CSID in patients with MTD.

Methods: 20 patients with MTD diagnosed in Kangbuk Samsung Hospital between March 2015 and March 2017, and 20 normal controls were enrolled. All participants were asked to vocalize a sustained vowel /a/ for more than 1.5 seconds, which was recorded and analyzed. Spectral and cepstral parameters were analyzed by measuring CPP, CPP F0, L/H ratio, and CSID using the Analysis of Dysphonia in Speech and Voice program (ADSV). Acoustic data such as F0(Hz), Jitter, Shimmer, NHR(noise to harmonic ratio) were obtained by using MDVP(Multi-dimensional Voice Program).

Results: Patients with MTD had high shimmer than normal group with significant correlation($P<0.001$), but Fo, Jitter and NHR were not found different between two groups with no significant correlation($P>0.005$). Patients with MTD had lower CPP and CPP F0, and significantly higher CSID($P<0.001$). Additionally, there was a high correlation

between CPP, CSID and GRBAS scale($P<0.001$). Receiver operating characteristic(ROC) analysis found that a threshold of 13.12 for CSID achieved a good classification for MTD, with 95% sensitivity and specificity.

Conclusions: Spectral and cepstral analysis of patients with MTD are especially meaningful than single acoustic parameters. This study also demonstrated the feasibility and usefulness of CSID in clinical practice and have correlation with GRBAS scale.

» **HNOP-22 12:20~12:30**

» **Voice outcomes after spontaneous recovery from unilateral vocal fold paralysis in patients who received early injection laryngoplasty with a long-lasting material**

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Ho Kyung JIN, Nayeon CHOI, Woori PARK, Young-Ik SON

Objectives: Injection laryngoplasty (IL) has become the one of major treatment options for postoperative unilateral vocal fold paralysis (UVFP). Early IL (within 1 month after UVFP) is recommended because it can reduce voice-related discomfort as well as pulmonary complication due to aspiration. However, there is a concern that long-lasting material used in early IL could negatively affect the voice quality when vocal fold motion is spontaneously recovered. **Methods:** The patients who received IL with a long-lasting material (Artesense®) within 1 month after development of postoperative UVFP were enrolled for this study. They were classified into a spontaneously recovered from UVFP group ($n=30$) and unrecovered group ($n=353$). The subjective and objective voice parameters were collected preoperatively and 3-6 months postoperatively. Age, gender, and voice parameters were compared between the two groups.

Results: There was no IL-related complication for all

subjects. Age and gender distribution were not significantly different between the two groups. Maximum phonation time (MPT), Jitter, Shimmer, NHR, overall grade (G) and breathiness (B) of GRBAS score, voice handicap index (VHI)-30 and VHI-10 significantly improved after IL in both groups. The amount of improvement in MPT, Jitter, Shimmer, NHR and VHI were significantly greater in the spontaneously recovered group.

Conclusions: When postoperative UVFP develops, early IL with a long-lasting material can be safely performed to improve voice quality and to reduce aspiration. In patients who showed spontaneous recovery from UVFP, most of subjective and objective voice parameters significantly improved after IL. The amounts of improvement were significantly greater in those patients when compared to patients who unrecovered from UVFP.

HNOP V

RM 2-3 (White Heron)

Chair : Jong-Lyel ROH, Dong Young KIM

Cancer research II

» **HNOP-23 13:30~13:40**

» Serum N-glycan profiling in patients with differentiated thyroid cancer

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Jae-Keun CHO¹, Sung Hyeon LEE², Byung-Joo LEE³, Young-Ik SON⁴

Objectives: To investigate the expression of serum glycans and estimate their diagnostic impact in patients with differentiated thyroid cancer

Methods: Patients who underwent thyroidectomy for benign thyroid nodules or differentiated cancer (papillary and follicular thyroid cancer) were enrolled in this study. The patients were divided into six groups: nodular hyperplasia (NH), papillary thyroid cancer without lymph node metastasis (PTC with N0), PTC with N1a, PTC with N1b, follicular adenoma (FA), and follicular thyroid cancer (FTC). We examined serum glycosylation changes through performing combined analysis with protein-specific immunoaffinity purification, glycan release, and mass spectrometry.

Results: Eleven glycan candidates were identified that distinguished PTC group from NH. Among them we selected 5 glycans with highly significant value ($P < 0.001$) as candidate serum markers to divide into PTC and NH. In addition, 3 glycan markers were showed significant value ($P < 0.05$) to discriminate between node negative and node positive groups. Regarding follicular neoplasm, 10 glycan candidates were identified that distinguished FTC from FA. Among them, we selected 3 glycans as candidate serum markers ($P < 0.001$) to help diagnosis of FTC.

Conclusions: Glycan profiling helped to discriminate between benign and malignant lesions in thyroid gland. This preliminary study suggested that analysis of serum N-glycan profiling may be useful diagnostic tool for differentiated thyroid cancer.

» **HNOP-24 13:40~13:50**

» Comparison of immune cell marker expression in blood and lymph node in head and neck tumors

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Soon-Hyun AHN, Joo Yeon CHOI, Woo-Jin JEOUNG, Young Ho JUNG, Sung Jun PARK

Objectives:In previous study, we recognized that the decrease in CD40L expression in tumor-free lymph node is related with poor prognosis. Furthermore, in animal study with CD4 or CD8 depletion, CD4 depletion resulted in delayed elimination of tumor cells injected in mouse tongue and this delay could be shortened by application of agonistic CD40 antibody. For the further research in human samples, the immune cell markers were evaluated in patients with head and neck tumors.

Methods:The study protocol was approved by institutional IRB. 39 patients were enrolled with corresponding consent form. A tumor free lymph node (when selected in cancer patients, we tried to select most remote lymph node in neck dissection specimen) and 10cc of blood were harvested from each patients during surgery. Thirteen benign salivary gland tumor patients and 26 malignant patients were included. CD4, 8, 40L, 40, 33, and 19 were stained and flow-cytometry analysis were performed for blood and lymph node samples. Student t-test was used for statistical analysis.

Results:When comparing the benign and malignant tumor patients, CD8 and CD40 expression in blood was significantly lower in malignant patients compared with benign tumor patients. Comparison between malignant group showed significantly lower expression of CD33 in lymph node in patients showed extracapsular spread.

Conclusions:The expression of immune cell marker showed difference between benign and malignant and also between patients with or without extracapsular spread and further study about general immune status will improve the understanding of patients' prognosis.

» **HNOP-25 13:50~14:00**

» Enhancement of integrin-mediated cell motility through snail expression in multicellular tumor spheroid

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²School of Biomedical Engineering, Korea University

**Byoungjae KIM¹, Nu-Ri IM¹, Do Hyun KIM¹,
Taeseok Daniel YANG², Kwang-Yoon JUNG¹,
Seung-Kuk BAEK¹**

Objectives:Multicellular tumor spheroids (MCTS) can display different cell-cell and cell-matrix interactions than monolayer cultures due to differences in expression of cellular adhesion molecules (CAMs). Here, we examined the expression of cellular adhesion molecules in monolayer and spheroid cultures of FRO cells, one of anaplastic thyroid carcinomas, and the motility of single cells from monolayers and dispersed cells from spheroids.

Methods:The spheroid of FRO cells were formed in low-attachment plate and monitored in live cell imaging device. The dispersed cells from spheroids and FRO monolayer cells were compared in CAM expression and motility. In addition, blocking antibodies against E-cadherin (DECMA) and $\beta 1$ integrin (AIIB2) were used to characterize the spheroid cells.

Results:As FRO spheroid was formed, the expression of cell adhesion molecules including

$\beta 1$ integrin was decreased except E-cadherin, indicating E-cadherin is major factor in forming MCTS. In addition, FRO spheroid was formed tightly in early period while outer cells of the spheroid were loosened with the decreased E-cadherin in late period, which is confirmed by treating DECMA to the FRO spheroid. With real-time imaging method the motility of FRO MCTS cells was increased relative to their monolayer counterparts. In addition, when the monolayer FRO cells were treated with AIIB2, FRO cells was similar to the dispersed MCTS cells in shape and motility, indicating loss of $\beta 1$ integrin in MCTS cells increased motility of MCTS. Interestingly, neutralizing E-cadherin of monolayer FRO cells induced the reduction of $\beta 1$ integrin. Among the EMT proteins, snail and slug was increased in forming spheroid, suggesting that snail or slug could be a mediator for increased motility of MCTS cells.

Conclusions:These findings show that the correlated expression of CAMs affect tumor dissemination and

suggest that spheroids may be a more relevant model than monolayer cultures to study tumor progression and metastasis.

» **HNOP-26 14:00~14:10**

» SOX2 activation predicts prognosis in patients with head and neck squamous cell carcinoma

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Young-Gyu EUN, Ji Hyeon CHUNG, Oh Eun KWON, Young Chan LEE

Objectives:SOX2 copy number and mRNA expression were analysed to examine the clinical significance of SOX2 activation in HNSCC. Gene expression signatures reflecting SOX2 activation were identified in an HNSCC cohort

Methods:Patients with HNSCC were classified into two subgroups according to the gene expression signature: SOX2-high and SOX2-low. The clinical significance of SOX2 activation was further validated in two independent cohorts. Moreover, clinical significance of SOX2 activation in response to radiotherapy was assessed in patients with HNSCC. The relationship between SOX2 activation and radiotherapy was validated in an in vitro experiment.

Results:Patients in the SOX2-high subgroup had a better prognosis than patients in the SOX2-low subgroup in all three patient cohorts. Results of multivariate regression analysis showed that SOX2 signature was an independent predictor of the overall survival of patients with HNSCC (hazard ratio, 1.45; 95% confidence interval, 1.09-1.92; P=0.01). Interestingly, SOX2 activation was a predictor of therapy outcomes in patients receiving radiotherapy. Moreover, SOX2 overexpression enhanced the effect of radiotherapy in HNSCC cell lines.

Conclusions:SOX2 activation is associated with improved prognosis of patients with HNSCC and might be used to predict which patients might benefit from radiotherapy.

» **HNOP-27 14:10~14:20**

» The ER vacuolization paratopotic cell death is induced by the interaction of mitochondria and ER stress in HNSCC

¹Department of Otolaryngology, Ajou university College of Medicine, ²Department of Molecular Science and Technology, Ajou University

Sung Un KANG¹, Hang Jun KIM², Dae Ho KIM², Yun Sang LEE¹, Yoo Seob SHIN^{1,2}, Jeon Yeob JANG¹, Ho-Ryun WON¹, Chul-Ho KIM^{1,2}

Objectives:Recently, new therapies targeting the intracellular organelles and mitochondria of cancer cells have been investigated. In particular, accumulation of misfolded proteins in the ER lumen plays an important role in ERAD and mitochondrial function. Recent studies also have evaluated that ER stress-related signals are associated with mitophagy and determine whether the cells are going to maintain homeostasis or activate cell death programs. Thus, understanding of alternative non-apoptotic cell death pathways, including paraptosis, may facilitate the design of novel therapies for head and neck cancers. Therefore, we investigated the mechanism of ER stress-induced mitophagy and verified its relationship with cell death.

Methods:We investigated the ER stress-mediated paratopotic effect of DIM-C-pPhtBu through in vitro and in vivo experiments using oral cavity cancer cells. ER stress-mediated mitophagy and paratopotic cell death were confirmed by RNA sequencing, TEM, immunocytochemistry, and subcellular fractionation. The mRNA and protein levels of ER stress and mitophagy-related genes were measured by quantitative real-time PCR and Western blot analysis. Transient knockdown system (siRNA) was used to confirm the molecular mechanisms.

Results:Our results demonstrated that DIM-C-pPhtBu significantly inhibited oral cavity cancer cells as determined by a cell proliferation assay. In addition, when DIM-C-pPhtBu was treated into cells, the RNA sequencing result revealed high expressions of ER stress-related genes.

Expression of mitophagy-related proteins was observed specifically in mitochondria. We also observed the location and expression of mitochondria and ER stress-related proteins with Immunocytochemistry and confirmed that mitophagy was inhibited when ER stress was suppressed. Conclusions: These findings indicate that mitophagy is essential for paraptosis and imply that new target drugs can be developed by examining the relationship between mitophagy and cancer cell death.

» **HNOP-28 14:20~14:30**

» ANO1 expression in anaplastic thyroid cancer

¹Department of Otorhinolaryngology, Korea University Ansan Hospital, ²School of Biosystem and Biomedical Science, College of Health Science, Korea University, ³College of Medicine, Korea University

Kyoung Ho OH¹, Jae-Yong PARK², BokKee EUN³, Jae Young KIM³, Soon Young KWON¹

Objectives: The purpose of this study was to determine ANO1 (Ca²⁺-activated Cl⁻ channels) expression in anaplastic thyroid carcinoma (ATC) and relation to malignant characteristics of ATC.

Methods: We conducted quantitative RT-PCR and Western-blot analysis with anaplastic thyroid cancer cell lines to evaluate mRNA and protein level of ANO1. Using ANO1 selective inhibitor (A01) and siRNA for knock-down, we determined the relation between cell migration and ANO1. Current density was confirmed by Whole-cell patch clamp recording of FRO cells. Immunohistochemistry staining revealed overexpression of ANO1 in human anaplastic thyroid cancer tissues.

Results: Upregulation of ANO1 was observed in human ATC tissues and cell lines. Inhibition of ANO1 activity decreased migration and invasion in FRO cells. Also, ANO1-knockdown showed critical reduction in invasion rate.

Conclusions: ANO1 plays a significant role in metastasis of anaplastic thyroid carcinoma.

HNOP VI

RM 2-3 (White Heron)

Chair : Kwang Yoon JUNG, Jin Pyeong KIM

Thyroid I

» **HNOP-29 14:30~14:40**

» Imaging of neck node metastases in well differentiated thyroid cancers is CT boon or bane?

¹Department of Radiodiagnosis, ²Department of Head and neck surgical oncology, ³Department of Pathology Tata Memorial Hospital, Mumbai, India

Dr. Abhishek MAHAJAN¹, Dr. Richa VAISH², Dr. Nilesh SABLE¹, Dr. Devendra CHAUKAR², Prof. Shubhada KANE³, Prof. Anil D'CRUZ¹

Objectives: To determine the diagnostic accuracy of imaging criterias on Ultrasonography and CECT for detecting neck Lymphnode metastases (LNM) in patients with PTC.

Methods: 313 neck node levels (239 lateral and 68 central compartment) in 43 patients with surgically confirmed PTC who underwent preoperative US and CECT and level wise node histopathology. We compared the diagnostic performance of USG criteria (short axis diameter, loss of hilum, heterogeneity, microcalcification and altered vascular flow) and CT criteria (enhancement, heterogeneity, microcalcification, cystic/ necrotic changes, round shape and size) for detecting LNM. Diagnostic accuracy of individual modality was also calculated with its impact on detecting ipsilateral +/- contralateral lateral and central compartment LNM.

Results: All USG criterias except size showed 100% specificity and 100% PPV and >80% NPV. Nodal enhancement as a predictor of LNM was the most sensitive (91%) CT criterion with 92% NPV. All CT criteria except size showed >95% specificity and >95% PPV. Combination of USG criteria showed no improvement in overall sensitivity. Combination of CT criteria significantly

improved overall sensitivity and NPV. Combined USG+CT imaging significantly improved the sensitivity for LNM. On level and region based analysis, CT imaging was found to have significant benefit in terms of detecting LNM at more than one level +/- contralateral LNM and central LNM.

Conclusions: Combination of imaging features significantly improve the diagnostic performance of CT. Addition of CT to USG not only improves the diagnostic performance but also has potential to detect multiple level and compartment as well as contralateral LNM.

» **HNOP-30 14:40~14:50**

» Development of novel diagnostic tool for thyroid cancer- electrical impedance spectroscopy

*Department of Otolaryngology-HNS, Research
Institute for Clinical Medicine of Chonbuk National
University*

Yong Tae HONG¹, Ki Hwan HONG²

Objectives: We have developed electrical biopsy needle (EBN) having bipolar interdigitated electrodes on a tip of hypodermic needle in order to improve an accuracy of detection of thyroid cancer tissues during biopsy and even surgery.

Methods: Prior to ex-vivo experiment using human thyroid tissues, the discrimination capability of the EBN was evaluated using various conductivity levels of solutions. The discrimination capability was rigorously verified based on experimental results as well as electrical equivalent circuit and curve fitting. Then, electrical impedances of all 13 patients' thyroid samples were measured in the sweeping frequency range from 1 Hz to 1 MHz and analyzed in various aspects. Further, histologic assesment of thyroid normal and cancer tissue was done

Results: The normal and cancer tissues were clearly discriminated by using EoN (EIS-on-a-needle, EIS: electrical impedance spectroscopy) at the frequency range from 15.9 kHz to 1 MHz. The largest differences between

normal and cancer tissues for the magnitude, phase, real, and imaginary part of impedance were observed at 251 kHz, 631 kHz, 251 kHz, and 398 kHz, respectively. The high sensitivity (85%) and specificity (85%) were obtained, which implied that the EBN is expected to provide the physicians with electrical information of normal and cancer tissues so that it can improve the in-vivo diagnostic accuracy

Conclusions: Here we reported the promising potential of the EBN to diagnose cancer tissues based on different electrical properties between human thyroid normal and cancer tissues. The EBN is expected to improve the in-vivo diagnostic accuracy on thyroid cancer tissues during FNA procedures. Furthermore, it can be utilized to diagnose cancer tissues in real-time when indeterminate tissue not detected in preoperative images was found at contralateral thyroid during surgery.

» **HNOP-31 14:50~15:00**

» Diagnostic performance of thyroid multimodal - imaging comprehensive risk stratification scoring (TMC-RSS) system in characterising thyroid nodules

*¹Department Of Radiodiagnosis, ²Department Of Head And Oncology Surgery, ³Department Of Pathology,
Tata Memorial Centre, Mumbai, India*

Abhishek MAHAJAN¹, Richa VAISH², Anil D'CRUZ², Nilesh SABLE¹, Shilpa PANDE¹, Peter PAUL¹, Shubhada KANE³, Devendra CHAUKAR², Pankaj CHATURVEDI², PS PAI², Gouri PANTVAIDYA²

Objectives: The aim of the study Create an algorithm (TMC-RSS-System) using Ultrasound features in combination with doppler, elastography (ES-Asteria) and test its diagnostic performance.

Methods: April 2015 to January 2016 prospectively collected data. All studies were performed on single equipment and US, Doppler, Elastography was performed

by same observer. Gold standard was pathology. 650 nodules (560-patients), final analysis 616 nodules. 47.2% Benign and 52.8% Malignant. TMC-RSS-System Positive characteristics Each-feature 3 points ES score 3 or 4, malignant nodes. Each-feature 1 point Taller than wider, microcalcification, hypoechogenic, solid, ill-defined margins, central +/- peripheral vascularity. Each-feature 0.5 point irregular halo, > 1cm diameter. Negative characteristic Each-feature 3 points Purely cystic, ES-score 1 Each-feature 1 point spongiform, comet-tail artefact, complete halo. Each-feature 0.5 point peripheral vascularity. Final TMC-RSS-System positive predictor score minus negative predictor score.

Results: Mean age-47.3yrs. Mean size- 2.3+/-1.5cm. Diagnostic performance of combined TIRADS, vascularity and ES (sensitivity 96%, specificity 95%, PPV 95%, NPV 96%, kappa.911) was statistically ($p > .001$) higher than USG, TIRADS, ES, TIRADS and ES, TIRADS and vascularity. On univariate analysis all US features and on multivariate analysis all except taller than wider was statistically significant for predicting malignancy ($p > 0.05$). TMC-RSS score had 90% sensitivity, 89% specificity and 91% accuracy for characterising the nodules. On the ROC curve the cut-off for best performance of TMC- RSS score was 5.75. The cumulative risk of malignancy based on TMC-RSS score was 2.4% for < 3.0 score, 18% for score 3-6 and 80%.

Conclusions: TMC-RSS-System can be the first step in standardizing reporting lexicon allowing effective clinico-radiological communication and will provide a holistic imaging approach for thyroid nodules.

» **HNOP-32 15:00~15:10**

» Comparison between 7th and 8th editions of AJCC staging system in the prediction of post-treatment recurrence in papillary thyroid carcinoma

¹Departments of Otolaryngology, ²Pathology, Asan Medical Center, University of Ulsan College of Medicine

**Sung Hoon NAM, MD¹, Jong-Lyel ROH, MD¹,
Gyungyup GONG, MD², Kyung-Ja CHO, MD²,
Seung-Ho CHOI, MD¹, Soon Yuhl NAM, MD¹,
Sang Yoon KIM, MD¹**

Objectives: The recent 8th edition of American Joint Committee on Cancer (AJCC) tumor-node-metastasis (TNM) staging system has been significantly changed from the previous 7th edition, in thyroid cancer. Therefore, we evaluated the clinical value of potential changes between 7th and 8th editions in terms of predicting recurrence-free survival (RFS) and disease-specific survival (DSS) after thyroidectomy for papillary thyroid carcinoma (PTC).

Methods: This retrospective study included a total of 3016 patients who underwent thyroidectomy for previously untreated PTC between 2006 and 2015. Clinical and pathological data of each patient were reviewed. T, N, and M classification, and overall TNM stage were defined according to 7th and 8th editions. The proportion of variation in survival time explained (PVE) was used as a method to compare staging systems to predict recurrence or death of papillary thyroid carcinoma, which implies that the higher the PVE value is the more useful staging system.

Results: The proportion of T1 and T2 tumors increased from 38.4% to 79.1% and 2.1% to 6.3%, respectively, whereas, the proportion of T3 tumor decreased from 53.2% to 11.3%. Nodal stage was not changed. Overall stage I and II tumors increased from 44.7% to 78.6% and 1.3% to 19.3%, respectively. Stage III and IIV tumors decreased from 42.0% to 1.9% and 12.0% to 0.1% respectively. Both the seventh and eighth editions TNM staging significantly predicted the DSS ($p < 0.001$). When predictability for DSS within each edition was measured by PVE, the eighth edition had a higher PVE value than the seventh edition staging (7.8% versus 11.5%, $P < 0.05$).

Conclusions: Recent staging system migrates to down-staging in a large proportion of PTC patients, resulting in better predictability of recurrence and survival when compared to the previous staging system.

» **HNOP-33 15:10~15:20**

» Clinical outcomes of thyroid lobectomy in papillary thyroid carcinoma without TSH suppression

¹Department of Otorhinolaryngology-Head and Neck Surgery, Seoul National University Bundang Hospital,

²Department of Otorhinolaryngology-Head and Neck Surgery, Seoul National University Hospital

**Sungjun HAN¹, Woo-Jin JEONG¹,
Soon-Hyun AHN²**

Objectives:TSH suppressive therapy(TST) after thyroid surgery has relationship with clinical outcomes of differentiated thyroid cancer(DTC). And American Thyroid Association guidelines recommend a modest degree of TSH suppression for low-risk DTC. However, the role of TSH suppression in lobectomy cases is not clear. Thus, the aim of this study is to investigate the clinical outcomes of thyroid lobectomy without TST for low-risk papillary thyroid cancer(PTC).

Methods:The medical records of 496 patients who undergone thyroid lobectomy for PTC were retrospectively reviewed. The pre- and post-operative USG, laboratory tests, postoperative pathologic results, and follow-up data were collected. The change of TSH, nodules of contralateral thyroid lobe, and loco- regional recurrence rates were analyzed.

Results:Total 496 patients were enrolled. 58 patients were excluded because of short follow-up duration or insufficient clinical data. 333 patients who did not take levothyroxine after thyroid lobectomy were analyzed. And 125 patients who took levothyroxine for subclinical hypothyroidism were grouped separately. In the group without synthroid medication, the mean TSH during follow-up was 2.91 mIU/L. In group with levothyroxine supplement, it was 2.32 mIU/L, and there was significant difference between them($p=0.001$). The mean duration of follow-up was 1084.6 days. After follow-up, two cases(0.6%) of recurrence were reported. The locations of recurrence were

contralateral thyroid lobe and ipsilateral neck nodes.

Conclusions:Thyroid lobectomy without TST for PTC showed favorable clinical outcomes, such as loco-regional recurrence rate and routine TSH suppression in lobectomy patients could be omitted.

» **HNOP-34 15:20~15:30**

» Our experience with microscope aided thyroidectomy

*Dep. Of Otorhinolaryngology & Head-Neck Surgery,
Aiiims, Rishikesh*

**Amit KUMAR, Saurabh VARSHNEY, Manu
MALHOTRA, Amit TYAGI**

Objectives:To study the operational feasibility and additional benefits of using surgical microscope for thyroidectomy and its effects on improving the surgical outcomes

Methods:We conducted the pilot study with cases of various thyroid neoplasm taken for thyroidectomies. Microscope was used for dissection and identification for thyroid and parathyroid vasculature and relationship of vasculature with the nerves around with the intent to study physiological effects of surgical dissection which can affect the long term postoperative outcomes. Preoperative and postoperative analysis was done as per international protocols.

Results:Pilot studies included 5 cases with one malignant and 4 benign lesions. Reported benefits are better visualization, discrete dissection with better identification of structures with no major difference compared to routine open thyroidectomies(whole surgery) in terms of operating time and blood loss. Surgeon comfort and ease of surgery was similar to open cases. Better perception of surgical anatomy of nerves and vessels helped in preservation of parathyroid vasculature and identifying relationship of nerves with tubercle of zuckerkandl. Accidental nerve injury could be identified and repaired which might have been missed with-out a microscope. Physiologic effects of

color change of the parathyroid gland and engorgement of draining veins noted whose long term implications can be studied in follow up. (videos 1 to 5)

Conclusions: Microscopic aided thyroidectomy helps in better identification of structures and it good tools of surgical education and training of residents. Noted changes in parathyroid venous vasculature which can have long term implications in parathyroid physiology and it requires long term follow up studies.

HNOP VII

RM 2-3 (White Heron)

**Chair : Osama Mohamed HASSAN,
Jeong-Soo WOO**

Best oral presentation

» **HNOP-35 16:50~17:00**

» Oncological outcome following intensification of treatment by transoral robotic surgery (TORS) for hpv negative stage iv oropharyngeal cancer a prospective trial

*Dep. of Head-Neck and Thoracic Surgical Oncology,
Fortis Memorial Research Institute*

**Karan GUPTA, Surender DABAS, Ashwani
SHARMA, Reetesh RANJAN**

Objectives: To see long-term oncological outcome of Transoral Robotic Surgery for intensification of treatment in addition to adjuvant Radiotherapy/chemoradiotherapy for Stage IV HPV negative oropharyngeal malignancies.

Methods: From March, 2013 to September, 2015, 86 patients with Stage IV (cT1-3N2) HPV negative oropharyngeal carcinoma underwent TORS & neck dissection using daVinci Surgical system. After TORS, patients received adjuvant radiation or chemoradiation. Patients were followed and evaluated for disease free survival and overall survival.

Results: A total of 86 patients (69 males and 17 females) underwent TORS. All patients were HPV negative. Mean age at presentation was 57.4 years (32-83 years). Escalation of therapy with TORS followed by 60-64Gy 5-6 cycles weekly Inj. cisplatin adjuvant RT/CTRT lead to better survival rates as compared to CTRT/RT alone. a.T1-3N2a 12 patients All underwent TORS followed by RT in 7 patients and CTRT in 5 patients. Ten patients are disease free and alive. b.T1-3N2b 56 patients After TORS, 40 patients received CTRT and 16 patients received only RT. 46 (82.1%) are alive and disease free. Six patients developed loco-regional recurrence. Four patients expired due to metastasis c.T1-3N2c 18 patients After TORS, 13 received adjuvant CTRT and 5 received RT. 10 (55.6%) were disease free and alive. Of 86 patients with Stage IVa Oropharyngeal Carcinoma, escalation of treatment with TORS followed by adjuvant CTRT/RT gave disease free survival of 76.7% and an overall survival of 88.4% on a mean follow-up of 40 months (27-57 months).

Conclusions: Transoral Robotic Surgery is a good option for cure in relatively radio-resistant HPV negative resectable oropharyngeal malignancies. TORS can be used to intensify treatment of Stage IV oropharyngeal carcinoma and avoid early and late toxicities due to higher doses of RT/CRT and achieve better oncological outcome.

» **HNOP-36 17:00~17:10**

» Factors associated with residual or recurrent disease within a year in oral cavity squamous cell carcinoma patients data in thai head and neck cancer referral center

*Center of Excellence in Otolaryngology Rajavithi
Hospital, Rangsit Univ. College of Medicine*
Tatsanachat JITTREETAT

Objectives: To determine factors associated to residual or recurrent disease within a year of Oral Cavity Squamous cell carcinoma patients in Thai Head and Neck Cancer Referral Center.

Methods:Retrospective Cohort study Population and Sample Oral cavity Squamous cell carcinoma patients who registered in Rajavithi Cancer Registry database from 1 January 2012 until 31 December 2017. All interested OSCC data in Rajavithi hospital cancer registry will be collected from registry database, Out patient records, In patient records, Operative chart records, and radiotherapy chart records. Patients who meet the inclusion criteria will record in case record forms, then import to statistical software. Baseline and clinical characteristics will be compared using descriptive statistics. Patient characteristics analyze by mean SD in continuous data, by percent in categorical data. Cox regression analysis will be performed using the statistical software.

Results:Total 200 cases of Oral Cavity Squamous cell Carcinoma Patients data were collected. We analysed data and the result showed male patient were majority of OSCC patients for 83.5% Mean of age were 59.6 years. Tongue Squamous cell carcinoma was the majority OSCC in our data. Cox regression analysis show Hazard Ratio of some interested prognostic factors were significantly but the most interested factor for waiting treatment time was not statistical significant (HR 1.23 95%CI 0.91-1.67) For other interested factors Staging of cancer and cell type of OSCC were statistically significant (HR 2.13 95%CI 1.92-2.78 and HR 1.34 95%CI 1.11-1.98 respectively)

Conclusions:Conclusion from our data show longer waiting treatment time were not associated with the residual or recurrent disease within a year of OSCC patients, also Gender and Age of the patients. Staging of tumor especially for pathological N stage and poor differentiation cell type were strong association with residual and recurrent disease within a year of OSCC patients.

» **HNOP-37 17:10~17:20**

» Smoking effect on human papilloma virus positive head and neck squamous cell carcinomas. The perspective from a genomic analysis

Department of Otolaryngology-Head and Neck surgery, Kangnam Sacred Heart Hospital, Hallym

University College of Medicine, Seoul, South Korea

Ji Hoon PARK, Jong Kyu LEE, Jin Hwan KIM, Il Seok PARK, Young Soo RHO, Dong Jin LEE

Objectives:Patients with HPV-positive HNSCCs have significantly higher overall and progression-free survival rates compared to HPV-negative HNSCCs patients. The superior survival, however, does not extend to all HPV-positive patients. Notably, smoking status of HNSCCs patients modifies prognosis. HPV-positive never smokers have significantly better survival compared to HPV-positive smokers, who in turn have better survival than HPV-negative HNSCC patients. The aim of this study is to show the effect of smoking to survival result of HPV positive and HPV negative HNSCCs. Also, we tried to show altered canonical pathways of HPV positive heavy smokers which were missed or newly developed when compared with those of HPV positive HNSCCs with better prognosis

Methods:We downloaded and analyzed gene expression data and clinical data of 270 head and neck squamous cell carcinoma from the Gene Expression Omnibus database: GSE65858 to assess the difference of altered canonical pathways in HPV positive HNSCCs patients with heavy smoking. Survival analyses were performed depends on the HPV state and smoking state of total 270 HNSCCs patients.

Results:When we evaluated the effect of smoking to survival result in HNSCCs, there was no statistical significant difference between heavy smokers and nonsmokers ($p=0.618$) even though heavy smoking showed altered canonical pathways related with aggressive behavior. HPV positive HNSCCs patients showed better survival than HPV negative HNSCCs ($p=0.08$). HPV positive HNSCCs showed distinct altered pathways when compared with HPV negative HNSCCs. Interestingly, in HNSCCs patients with heavy smoking, HPV positive patients didn't show any survival advantage when compared to HPV negative patients. With Ingenuity Pathway Analysis(IPA), we discovered total 130 missed and 19 newly developed canonical altered pathways in heavy smoking

patients with HPV positive HNSCCs.

Conclusions: In HNSCCs patients with heavy smoking, HPV positive patients didn't show any survival advantage when compared to HPV negative patients. Using genomic analysis and altered pathways analysis, we could find missed and newly developed several canonical pathways induced by heavy smoking in HPV positive patients

» **HNOP-38 17:20~17:30**

» **Specific in vivo diagnosis and combinatorial treatment strategy for metastatic BRAF (V600E) mutant anaplastic thyroid cancer**

¹Department of Radiology, Yonsei University College of Medicine, ²Systems Molecular Radiology at Yonsei,

³Systems Molecular Oncology for Head & Neck Cancer, ⁴Department of Otorhinolaryngology-Head and Neck Surgery, Korea University College of Medicine

Minhee KU^{1,2}, Nara YOON^{1,2}, Yun Jae KIM^{1,2}, Jaemoon YANG^{1,2}, Hyung Kwon BYEON^{2,3,4}

Objectives: Our previously developed near-infrared-sensitive supramolecular hydrogel(NIRSH) with hyaluronic acid as a molecular probe for targeted imaging of CD44-expressing cancer cells was consistently feasible in BRAF mutant anaplastic thyroid cancer(ATC). This study investigated the utility of NIRSH imaging as a modality to specifically detect metastatic BRAFm ATC. Furthermore, based on the previous finding that c-Met and Src expressions were increased following BRAF inhibition, the optimal therapeutic strategy against metastatic BRAFm ATC was investigated.

Methods: The previous fabrication methodology of NIRSH was refined by stabilizing with an EDC/NHS crosslinker(cl-NIRSH) and its stability was evaluated. in vivo metastasis mouse models were prepared by injecting 8505C cells at the tail veins of nude mice. Drugs were administered the following day under each treatment conditions; 1)control(DMSO),2)PLX4032,3)dasatinib,4)PLX4032+PHA665752,5)PLX4032+dasatinib. Together

with the IVIS imagings acquired after cl-NIRSH injection, T2-weighted and diffusion weighted imagings(DWI) were achieved with 9.4T MRI. Apparent diffusion coefficient(ADC) values were confirmed by color mapping the DWI signal intensities.

Results: The cl-NIRSH probes were proved to be more stable and the signal intensities were more readily increased in IVIS imaging compared to the former NIRSH probes. The metastatic lung nodules could be specifically detected in the positive control group. Also, the number of metastatic lung foci were significantly smaller in the PLX4032+dasatinib treatment group, suggesting maximal therapeutic effect in controlling BRAFm ATC metastasis. This finding was supported by the signal intensities of cl-NIRSH imagings and ADC values from DWI.

Conclusions: CD44-targetable cl-NIRSH imaging shows potential as a robust, non-invasive in vivo imaging tool in detecting metastatic BRAFm ATC. Whatsmore, simultaneous BRAF and Src inhibition have the greatest impact in cancer metastasis and should be considered in the therapy.

» **HNOP-39 17:30~17:40**

» **A comparative study of angiolytic versus CO2 laser stripping of vocal fold leukoplakia long-term disease control and voice outcome**

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²Department of Otorhinolaryngology The institute of Logopedics & Phoniatrics, Yonsei University College of Medicine

Kwangha BAEK¹, Gina NA¹, Jihyung KIM¹, Seungjin LEE², Jae-Yol LIM¹, Hong-Shik CHOI¹

Objectives: Vocal fold leukoplakia, white plaque on epithelium has a potential of malignant transformation regardless of dysplasia grade. It has been commonly treated by various technique using different types of laser (CO2 or angiolytic), but only a few studies exist regarding

comparative results of laser treatment. In this study, we investigated the clinical outcomes of laser stripping using CO2 versus angiolytic lasers on long- term disease control and voice preservation

Methods: Seventy patients with vocal fold leukoplakia treated by CO2 or angiolytic lasers (KTP or PDL) were identified from our retrospective database. Data regarding patient characteristics, treatment details, treatment outcomes on disease control and voice laboratories; voice handicap index (VHI), GRABS, and acoustics were evaluated. Mean follow-up was 32 ± 26 months.

Results: The study group consisted of 14 patients who had received laser stripping with CO2 laser and 56 patients with angiolytic laser. Among 14 patients treated by CO2 laser, 3 patients (21.4%) showed recurrent leukoplakia. Among 56 patients who underwent angiolytic laser stripping, 12 patients (21.4%) recurred. Overall disease control rate between two treatments was not significantly different. In the CO2 laser group, VHI score increased ($P=0.046$) postoperatively, and G score was also worsened ($P=0.756$). However, postoperative VHI score was significantly improved ($P=0.03$) and G score was also significantly decreased ($P<0.001$) in the angiolytic laser group. The voice preservation rate was significantly excellent in the angiolytic laser treatment group as compared to CO2 laser group ($p = 0.05$).

Conclusions: The recurrence or progression rate between angiolytic laser (PDL or KTP) and CO2 laser stripping was similar. Besides, the patients of angiolytic laser stripping showed better preservation of voice than those with CO2 laser. Angiolytic laser stripping is suggested as an effective treatment of options for vocal fold leukopolakia on disease control and voice preservation.

» **HNOP-40 17:40~17:50**

» Increased expression of calcium voltage-gated channel expression in aging vocal fold by comprehensive transcriptome analysis of next generation sequencing

¹Department of Otorhinolaryngology-Head and Neck Surgery, Pusan National University School of Medicine, Pusan National University Hospital, ²Division of Bio-Medical Informatics, Center for Genome Science, Korea National Institute of Health, Korea Centers for Disease Control and Prevention
Sung-Chan SHIN¹, Ji Min KIM¹, Hyoung-Sam HEO², Min-Gyu JO¹, Hyo-Seok SEO¹, Hyun-Keun KWON¹, Byung-Joo LEE¹

Objectives: Aging vocal folds have thin lamina propria and the change of extracellular matrix composition of lamina propria. There is not yet much research on this mechanism yet. We investigated the change of genes of vocal fold in aging rats by next generation sequencing (NGS) analysis for the lamina propria tissue of old and young rats.

Methods: H&E staining, Verhoeff staining and immunohistochemistry were performed in vocal fold for aging related genes in old rats (22-month old, 8 rats) compared to young rats (6-month old, 8 rats). For the NGS study, 8 young rats aged 6 months and 8 old rats aged 22 months were used. NGS was performed for the harvested lamina propria of the vocal folds in each rat. NGS data were analysed by the functional annotation using gene ontology and network pathway and network analysis method.

Results: The cellular density of lamina propria and the expression of elastin were decreased in old rats ($p<0.05$). The expression of collagen type I was increased and denser in the 22 months old rats compared with 6 months old rats ($p < 0.05$). However, the rats showed unchanged in collagen III and hyaluronic acid deposition in vocal fold of aging rat. After NGS data analysis, the 8 genes were identified, such as, *Cacng1* (calcium voltage-gated channel auxiliary subunit gamma 1), *Cacnb1* (calcium voltage-gated channel auxiliary subunit beta 1), *Mylk2* (myosin light chain kinase 2), *Actn3* (actinin alpha 3), *Mybpc2* (myosin binding protein C, fast-type), *Prkag3* (protein kinase AMP-activated non-catalytic subunit gamma 3), *Myom2* (myomesin 2) and *Cacna1s* (calcium voltage-gated

channel subunit $\alpha 1 S$). In immunohistochemistry, the expression of calcium voltage-gated channel related genes, such as, *Cacng1*, *Cacnb1*, and *Cacna1s*, were increased in aging vocal fold than young rat.

Conclusions:NGS analysis of the lamina propria of young and old rats revealed that calcium channel related genes were increased in aging vocal fold. Further studies on the role of the calcium channel in vocal fold aging are needed.

Resident Paper Award

RM 3-3 (Diamond)

Chair : Sung Min CHUNG, Hong-Shik CHO

Resident Paper Award

» **HNOP-19 11:50~12:00**

» An evaluation of uncertainty for voice assessment

*Department of Otorhinolaryngology-Head and Neck
Surgery, College of Medicine, Chung-Ang University
Hospital*

**Yang-Ho LEE, Hoon-Shik YANG, Seok Chan
HONG, Seun-Ah KO, Sei-Young LEE**

Objectives:The voice reflects the overall health status of a person, and an objective assessment of this is important. In recent years, interest in human body measurement has been increasing, and uncertainty must be evaluated to ensure accurate measurement and reliability. In this study, Speech analysis was performed and the uncertainty factors were determined for the Fundamental Frequency, Jitter, Shimmer and HNR values and the combined uncertainty was calculated.

Methods:The uncertainty of microphone in calibration certificate (Type B), the uncertainty due to the resolution (Type B) and the uncertainty of the repeatability of the test obtained by performing 10 tests on one normal male adult (Type A) were included in calculating combined standard uncertainty. **Results:** The uncertainties were found to be 0.620, 0.011, 0.090, and 0.451 for the Fundamental Frequency, Jitter, Shimmer, and HNR, respectively.

Results:The uncertainties were found to be 0.620, 0.011, 0.090, and 0.451 for the Fundamental Frequency, Jitter, Shimmer, and HNR, respectively.

Conclusions:This is the first study to analyze the uncertainty of voice test. More studies should be conducted on a wider variety of people.

Korean
Session

ORLSP Audiologist

RM 3-1 (Emerald A)

Chair : Seung Hwan LEE

Practical Instructions and Strategies
for Emerging Audiological Assessment

» 13:30-13:50

» Chirp-evoked ABR

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Auditory brainstem response (ABR) is an objective method for measuring hearing level. However this method has some limitations. Conventional click ABR reflect hearing status more around 4 kHz. So if patient have a low frequency problem, such as small acoustic schwannoma, ABR cannot detect well. Chirp -evoked ABR is recently developed method. It is designed to weigh all portion of cochlea equally. So Chirp-evoked ABR has a advantage to detect the small sized acoustic schwannoma. This talk will introduces the concept of chirp-evoked ABR and its applications.

» 13:50-14:10

» Detection of cochlear dead region TEN test

Korea University Anam Hospital

Gi Jung IM

소리는 와우(cochlea) 내 특정 영역 기저막(basilar membrane)을 움직여 고유의 characteristic frequency(CF)를 만들어내고 이를 통하여 저음부터 고음까지 주파수, 즉 소리의 높낮이를 구별할 수 있게 된다. 이러한 과정에는 소리의 증폭을 위한 외유모세포(outer hair cell)의 증폭 기능(active mechanism)이 크게 관여되며, 증폭 조절된 소리를 내유모세포(inner hair cell)가 감지해 낸다. 난청, 즉 청력소실(hearing loss)이란 이러한 유모세포의 손상에 의한 것이다. (1-4) 특히, 55 dB까지의 청력소실은 주로 외유모세포의 손

상에 의하여 초래되지만, 그 이상의 청력소실은 외유모세포뿐만 아니라 내유모세포의 손상 및 연결된 청각신경의 손상/기능부전에 의하여 초래된다. 이처럼 와우 특정 영역의 내유모세포의 손상 및 연결된 청각신경/나선신경절의 손상/기능부전이 일어난 것을 “lacunae”, “holes in hearing”, “dead zones”, 또는 와우소실영역(cochlear dead regions)이라 명명하였다. (5-8) 와우소실영역이라 함은 와우 내 기저막 특정 주파수 부위의 내유모세포 또는 나선신경절(spiral ganglion) 세포들이 소실되었거나 손상되어 기능적으로 제 역할을 수행하지 못하는 영역을 말한다. 따라서 와우소실영역에서는 소리가 기저막을 진동시켜도 해당 주파수 영역의 청각 정보가 상위 청각신경계로 전달하지 못하게 된다. 그럼에도 불구하고 실제 순음청력검사서 와우소실영역이라도 일정 강도의 소리에 반응을 보이는 청력을 지니는 것처럼 보이게 된다. 그 이유는 와우소실영역의 주파수에 해당하는 소리가 일정 강도 이상 크게 입력되면 와우소실영역이 아니라 그 주변의, 내유모세포/나선신경절 세포들이 손상되지 않은 부위의 기저막이 반응하여 소리를 인지하게 되어 마치 그 부분에 청력이 있는 것처럼 잘못 측정되는 것이다 (탈주파수 인지, off-frequency listening). 중고도 이상의 난청 환자에서 와우소실영역이 있을 경우라도 위에서 기술한 탈주파수 인지 현상 때문에 피검자의 해당 주파수 영역 순음청력 역치가 실제 역치가 아닐 가능성이 높다. 따라서 기존에 널리 시행하는 순음청력검사로는 와우소실영역이 있는지 여부를 진단할 수 없다. 특히, 중고도 이상의 난청 환자에서 와우소실영역은 조사한 저자에 따라 30%-80%로 다양하게 보고되고 있다. 실제 임상에서 이렇게 내유모세포/나선신경절의 손상으로 인한 와우소실영역이 있는 환자들은 해당 주파수 대역의 소리 정보를 증폭하여준다 하더라도 왜곡되어 뇌로 전달될 수밖에 없고 따라서 특히 보청기 조절 시 어려움을 초래하게 된다. 만일 와우소실영역대의 과도한 소리 증폭은 피드백 발생을 유발하고, 탈주파수 인지 현상에 의하여 다른 영역의 왜곡을 발생시킬 수 있다. 이러한 잘못된 증폭과 조절이 축적되면 오히려 전체적인 어음인지를 감소시킬 수 있다. 여러 연구들에서 보청기 적합/조정 시 와우소실영역에서 소리증폭을 하지 않거나 목표이득의 50%~80%로 주는 방식이 추천된다. 또 다른 방법으로는 주파수 압축/변환 보청기를 이용하여 해당 주파수 정보를 소실되지 않는 주파수 영역으로 전달하는 방식 등이 추천되고 있다. 와우소실영역을 진단할 수 있는 검사법으로는 청력역치등가소음(threshold equalizing noise, TEN)검사가 있다. 청력역치등가소음(TEN) 검사법은 차폐시 전주파수 대역에서 동일한 차폐 효과를 주는 광대역 청력역치등가소음을 이용하여 탈주파수 인지 현상이 일어나는 경계주파수의 반응을 차폐함으로 차폐역

치(masked threshold)가 제시된 청력역치등가소음보다 일정수준(10dB) 이상 상승하는 것을 확인하여 와우소실영역을 확인하는 검사이다. 이 검사는 실제 임상에서 적용 가능할 정도로 검사시간이 단축되었으며, 민감도 및 특이도가 높은 것으로 확인되어 국내외 여러 클리닉에서 사용 빈도가 증가하고 있다. 즉, TEN test는 일정소음(TEN: threshold equalizing noise) 하에서 와우소실영역의 순음청력을 측정하였을 때, 유의하게 청력역치가 올라가며, 잘 못 듣게 되는 현상을 이용하는 것이다. TEN test는 초창기 CD와 연결된 청력검사기기였지만 현재는 청력검사기기에 내장된 형태로 향상되었으며 주로 500, 750, 1000, 1500, 2000, 3000, and 4000 Hz 정도의 영역을 검사할 수 있다. 청력소실이 60 dBHL과 같거나 좋은 경우, 청력역치등가소음은 70 dBHL에 맞추어 검사한다. 만일 청력소실이 70 dBHL 이상인 경우 청력역치등가소음은 청력역치보다 10 dB 높게 주게 되는데, 예를 들어 청력소실이 75 dBHL라면 청력역치등가소음은 85 dBHL로 주게 되는 것이다. 만일 청력역치등가소음이 너무 불편하거나 90 dBHL에 도달하는 경우 청력역치등가소음을 청력역치에 맞추고 검사를 할 수 있다. 사실상 청력역치가 90 dBHL를 넘어서서 TEN test가 불가능할 정도이면 그 검사 영역은 와우소실영역이라고 여길 수 있다. 대개 선택한 주파수에서 2 dBHL 간격으로 검사하는 것이 기본적이다. 정상인에서는 청력역치등가소음이 70 dBHL이라면 청력역치도 70 dBHL인 경우가 대부분이다. 그러나, 와우소실영역이 있는 난청환자에서는 청력역치가 청력역치등가소음보다 10 dBHL 이상 높게 나타나기 때문에 80 dBHL 이상의 역치를 보이게 된다. 이처럼 TEN test는 (1) 고음 영역의 와우소실영역을 알아내어 보청기 조절을 가능케 하고, (2) 메니에르병 환자에게처럼 저음 영역의 와우소실영역을 알아내어 이를 교정할 수 있는 여지를 주며, (3) 불규칙한 와우소실영역을 지나거나, 특히 인공와우 환자들에게 있어 어느 부분을 인공와우로 자극해주고, 어느 부분을 보청기로 자극할지를 결정해 줄 수 있다. 또한, (4) 신경적 이상이 있거나 뇌 일정 영역의 손상으로 보청기 적용이 어려운 환자에 있어 와우소실영역을 알아내어 최적의 보청기 선택 및 조절을 가능케 한다. (9-19)

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dys-synchrony and its perceptual consequences. Trends Amplif. 2005;9:1-43. 19. Langenbeck B. Textbook of Practical Audiometry. London: Edward Arnold; 1965.

» 14:10-14:30

» Bone conduction hearing test

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순음청력검사는 외이, 중이, 내이로 구분되는 귀의 해부학적인 구조에 따라서 기도청력검사와 골도청력검사 방법으로 나뉘어 진다. 기도청력은 주어진 음이 외이와 중이를 거쳐 내이를 따라 전달되지만 골도청력의 경우 두개골에 주어진 음의 진동이 직접 내이로 전달되어 피검자가 음을 청취하기 때문에 외이나 중이 상태에 거의 영향을 받지 않는다. 따라서, 기도청력과 비교하여 난청의 원인이 전음기관에서 발생하는 장애인지 소리를 감지하는 달팽이관(와우)이나 중추청각신경계의 장애인지 혹은 양자가 혼합된 것인지를 판단하기 위해 시행한다. 골도청력검사의 시행시 자극음은 골진동기를 통해 주기 때문에 이를 정확하게 장착하는 것이 검사의 시행시 매우 중요하며, 대개 유양돌기부에 모발을 피해 고정한다. 경우에 따라서 이마에 골진동기를 위치시킬 수도 있다. 기도청력과 동일하게 1000Hz에서 시작하여 고주파수 - 저주파수 역치 순서로 측정하지만 250Hz, 500Hz, 1000Hz, 2000Hz, 3000Hz, 4000Hz만 검사한다. 또한, 이론적으로 골도청력검사에서 주파수별 이간감약은 0-5dB 밖에 되지 않아서 검사의 진행시 항상 차폐(마스킹)를 해야한다. 골진동기의 최대 강도는 대개 60~75dBHL 정도로 고심도 청력손실을 측정하는데 한계가 있으며, 250Hz 이하의 저주파 영역 검사에서 고강도음을 제시한 경우 피검자가 소리로 듣기보다는 촉각으로 느끼고 반응할 수 있기 때문에 검사의 진행과 결과 판독시 주의가 필요하다. 청성뇌간반응검사는 음 자극 후 청각전도로에서 일어나는 일련의 전기적 변화를 표면전극을 이용하여 기록하는 가장 객관적인 검사방법으로 자극음을 주는 트랜스듀서는 헤드폰, 삽입송화기, 음장수화기, 골진동기 등이 있다. 골진동기를 이용한 청성뇌간반응은 파형의 왜곡이 잘생기고 여러 변수에 의해 파형이 다양하게 나타나며, 차폐, 잡파, 자극음의 강도제한(35~45dB nHL) 등의 여러가지 한계성이 있어 임상적 가치는 크지않다. 하지만 정상 신생아에게서는 반응률이 높아 기도 청성뇌간반응 역치와 비교함으로써 신생아의 청력손실

유무 및 난청 형태를 구분하고 판정에 이용할 수 있다.

Pure tone audiometry is divided into the airway hearing test and the bone auditory test method according to the anatomical structures of the ear, middle ear, and inner ear. In the case of auditory hallucinations, the sound of the sound given to the skull is transmitted directly to the inner ear, and the subject listens to the sound, so that the auditory hearing is hardly affected by the outside or middle ear condition. Therefore, compared to the airway hearing, the cause of the hearing loss is the disorder of the cochlea (wah) or central auditory nervous system that detects the sound of the disorder occurring in the vestibular organs, or whether it is a mixture of both. Because the auditory stimulation is performed through the bone vibrator during the bone audiometry test, it is very important to mount it correctly and it usually fixes the hair on the mastoid protrusion. In some cases, the bone vibrator may be placed on the forehead. It is measured in the order of high-frequency low-frequency threshold, starting at 1000Hz, just like praying hearing, but only at 250Hz, 500Hz, 1000Hz, 2000Hz, 3000Hz and 4000Hz. In addition, theoretically, in bone hearing tests, the interaural attenuation is only 0-5 dB, so masking should always be done during the examination. The maximum intensity of the bony vibrator is usually about 60 to 75 dBHL, and there is a limitation in measuring the hearing loss of the high degree of hearing. When the high intensity sound is presented in the low frequency region test below 250 Hz, the testee can feel and respond to the tactile sense And care should be taken when reading results. The auditory brainstem response test is the most objective test method to record a series of electrical changes occurring in the auditory conduction path after sound stimulation using the surface electrode. The transducer that gives the stimulus sound is headphone, inserted sound transmitter, sound field receiver, and bone vibrator. The auditory brainstem response using the bone vibrator is well tolerated by the waveform distortion, the waveform is varied by various parameters, and the clinical value is large due to various limitations such as shielding, handwriting, and the intensity limitation of stimulus sound

(35 ~ 45dB nHL) not. However, in normal neonates, the rate of response is high, so it is possible to distinguish the presence of hearing loss and the type of hearing loss in the neonate by comparing it with the airway auditory brainstem response threshold.

» 14:30-14:50

» Tinnitusogram

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Medical Center
Hyunjoon SHIM

Tinnitusogram은 환자가 느끼는 이명의 특성을 정량화 시키기 위한 심리음향학적 도구이나 그 방법이 표준화되어 있지 않아 각 검사 때마다 자체적으로 약속된 검사 프로토콜을 가지고 있는 것이 중요하다. 이명 자체가 실존하는 물리적인 소리를 듣는 것이 아니고 청각피질에서 증가된 신경 방전을 느끼는 phantom sense이므로 환자의 상태와 검사환경에 따라 결과가 변화될 수 있다는 점을 알고 있어야 한다. 1) Pitch matching: 먼저 순음을 이용하여 matching을 시도하지만 환자의 이명은 순음이 아니므로 환자가 느끼는 소리의 스펙트럼에서 가장 돌출된 주파수를 측정한다는 점을 이해하고 검사에 임하여야 한다. 순음으로 matching할 때는 무리하게 피험자에게 matching을 강요하면 오류가 생기기 쉬우니 그러한 경우에는 협대역잡음, 광대역잡음 등을 이용하는 것이 좋다. 순음으로 pitch matching된 경우 옥타브 착각을 피하기 위하여 측정된 주파수의 한옥타브 아래 위 소리를 들려주면서 다시 한번 확인한다. 검사자체의 재현성 문제와 이명 자체의 변동성을 감안하여 최소한 다른 날 한번 더 검사하여 동일한 결과가 나오는지 확인할 필요가 있다. 2) Loudness matching: pitch matching으로 찾아낸 이명 주파수의 순음을 이용하여 loudness matching을 시도하게 되는데 해당 주파수의 순음청력 역치보다 얼마나 더 큰 소리를 느끼고 있는지 찾게 되고 대개 dB sensation level (SL)로 기록하게 된다. SL은 환자가 느끼는 loudness 단위가 아니라 소리 강도의 단위이므로 같은 SL이라든 equal loudness curve를 고려하면 3-4 kHz에서 측정된 경우 다른 주파수에서 측정된 경우보다 실제 환자가 느끼는 loudness는 더 크다는 사실을 알아야 한다. 또한 난청이 있는 주파수에서는 음의 누가현상이 있으므로 같은 SL이라도 정상청력 주파수에 비하여 실제 환자가 느끼는 loudness는 훨씬

더 큰 경우라고 생각하여야 하고 경우에 따라 0 dB SL 또는 -dB SL로 측정되는 경우도 있다. 그러므로 dB SL 단위로 측정된 이명의 크기는 이명의 불편감을 제대로 반영하지 못할 수도 있다. 3) 최소 차폐역치: Pitch matching된 이명주파수 순음으로 측정할 수 있고 협대역잡음 또는 광대역잡음을 이용하여 측정할 수도 있으며 대개 dB SL로 기록하게 된다. 환자가 느끼는 이명을 차폐할 수 있는 역치를 측정하는데 환자가 느끼는 이명의 loudness와 높은 상관관계를 보인다. 이명 치료 후 이명 크기의 변화를 객관적으로 측정하는 지표로 이용되기도 한다. 4) 불쾌역치: 이명환자의 경우 청각과민을 동반하는 경우가 많고 소리치료를 참고 자료로 이용할 수 있으므로 이명도 검사에 포함시켜서 시행하는 것이 좋고 dB HL로 표시한다. 순음을 이용하는 경우 되도록 많은 주파수에서 측정하는 것이 좋겠지만 최소한 저주파수와 고주파수 한가지씩 정하여 측정하는 것이 좋겠다.

» 14:50-15:10

» Audiological diagnosis of auditory neuropathy spectrum disorder

*Department of Otolaryngology-Head and Neck
Surgery, Dong-A University College of Medicine*

Sung Wook JEONG

Auditory neuropathy spectrum disorder (ANSD) is characterized by evidence of normal outer hair cell function and absent or abnormal auditory nerve function. Therefore, ASND is diagnosed when otoacoustic emission (OAE) or cochlear microphonic (CM) is present and auditory brainstem response (ABR) is absent or severely abnormal. Measurements of OAE and ABR are straightforward, so the diagnosis of ANSD is easy in most occasions. However measurement of OAE may be compromised by presence of residual fluid in the ear canal or middle ear in newborns and by presence of otitis media with effusion (OME) in young children. Furthermore OAE may be present initially and disappear over time in individuals with ANSD. CM provides a valid measure of outer hair cell function and is reliably recorded in the presence of OME and in individuals with ANSD despite loss of OAE. CM can be easily recorded using standard ABR recording protocols when the

recording principle of CM is kept well. The detail of the principle will be told in the presentation.

» 15:10-15:30

» Cervical and ocular vestibular myogenic potential

*Department of Otolaryngology-Head & Neck surgery,
Dankook University Hospital*

Min Young LEE

Vestibular evoked myogenic potential (VEMP) has been adopted for the evaluation of vestibular function after the first introduction by Colebatch and Halmagyi. At the beginning, studies were mostly using the cervical VEMP (cVEMP), which is recording inhibitory muscular responses from the neck. However recently, there is increasing usage of ocular VEMP (oVEMP), which is excitatory response from external ocular muscle. Thus, clinicians and researcher needs to access the techniques for two different VEMP recording procedures. cVEMP: Principle and generator cVEMP is known to reflect the function of saccule and inferior vestibular nerve. In contrast to the other vestibular testing procedures, cVEMP response is thought to be generated by inhibitory response of muscle contraction. Methodology cVEMP could be recording from various neck muscles. Among the neck muscles, sternocleidomastoid (SCM) muscle is well known recording site. To perform the recording, adequate and symmetric contraction of muscle is required. There is several ways to achieve this contraction. It could be done by head rotation, elevation, and rotation + elevation. One of the important factors for VEMP recording is getting a symmetric contraction. To achieve symmetric contraction, using mean rectified voltage, barometer to evaluate contraction power could be applied. Three electrodes, which are active, inactive and ground, are used for the recording procedure. Active electrode is placed mid part of SCM, inactive electrode in sternum and ground in mid forehead. For the stimulus, 500Hz tone burst and click are widely used due to the expected characteristic frequency of saccule which

is 500 Hz. oVEMP: Principle and generator In contrast to cVEMP, oVEMP is excitatory response which recorded in the contralateral inferior oblique muscle. And expected generator is thought to be utricle and superior vestibular nerve. Methodology For the oVEMP recording, electrode is placed just below the mid eye point (active), 1~3 cm below active electrode (inactive) and ground electrode is placed in forehead as cVEMP. Recording should be performed at contralateral side of stimulated ear due to the crossover of information. oVEMP has relatively low amplitude and low provocation rate, but simultaneous bilateral recording is possible. Not much posture related variance of oVEMP recording is known, but it would be necessary to collect the outcomes from different conditions and postures for recording. In addition, there is the study that clock-wise 20~30 degree up gaze has shown the best oVEMP recording compared to other eye gazes due to the close location of inferior oblique muscle and electrode with this gaze. Conclusion cVEMP and oVEMP is a unique vestibular function test that is evoked by acoustic stimulus. cVEMP is clinically important because it is evaluating the saccule and inferior vestibular nerve. Many studies of oVEMP procedures and outcome have been published and further wide application of oVEMP as well as cVEMP is expected.

*Korean
Session*

ORLSP Nurse 1

RM 3-2 (Emerald B)

Chair : 정만기, 김태훈

흔한 이비인후과 질환에 대한 이해

» 13:30-13:50

» 성인 경부 악성 종양의 증상, 진단 및 치료

Soonchunhyang University Cheonan Hospital

Jaehong PARK

• Head and Neck Cancer is a group of cancers from different several areas above the collar bone • The way of head and neck cancer behaves depends on the site in which it. • The most common type of cancer in the head and neck is Squamous cell carcinoma, which arises in the cells that line the inside of the nose, mouth and throat. • Head and neck cancer includes cancers of the Mouth, Nose, Sinuses, Salivary glands, Throat and Lymph nodes in the neck Cancers spread in three main ways • Direct extension from primary site to adjacent areas. • Spread through the lymphatic channels to lymph nodes. • Spread through the blood vessels to distant sites in the body. Subdivision of Head and Neck Cancer • Cancers of the Nasal cavity and Paranasal Sinuses • Nasopharyngeal cancer • Oral cavity cancer • Oropharyngeal cancer • Hypopharyngeal cancer • Laryngeal cancer • Salivary gland cancer • Others : Trachea, EAC, Skin, Esophagus... Symptoms of Head and Neck Cancer Oral cavity • A white or red patch • Swelling • Bleeding • Pain and uncomfortable feeling • Ulcers • Papillomatous lesion Nasal cavity and sinuses • Sinuses that are blocked and do not clear • Chronic sinus infections that do not respond to treatment with antibiotics • Bleeding through the nose • Frequent headaches • Swelling or other trouble with the eyes • Pain in the upper teeth • Problems with dentures Salivary glands • Swelling under the chin or around the jawbone • Numbness or paralysis of the facial muscle • Intractable pain in the face, chin or neck Oropharynx and Hypopharynx • Pain • Dysphagia / Odynophagia • Muffled voice • Snoring • Dyslalia • Bleeding / Melena • Ear pain Nasopharynx • Pain • Muffled voice • Frequent Serous Otitis Media • Diplopia • Bleeding / Melena • Neck mass • Ptosis • Hoarseness Larynx Voice change Hemoptysis dyspnea Diagnostic Test • Physical examination • Endoscopy • Laboratory tests • X-rays • CT scan • MRI • Biopsy • FNAC / Core needle biopsy Treatment Surgery, RTx, CTx Single or combined modality Follow up • Regular follow-up care is very important after treatment for head and neck cancer to make sure the cancer has not returned, or that a second primary(new) cancer has not developed. • Depending on the type of cancer, medical

checkups could include exams of the stoma, mouth, neck and throat. • Regular dental exams may also be necessary

» 13:50-14:10

» 비염의 치료 전략 – 처음부터 끝까지

¹Department of Otorhinolaryngology-Head and Neck surgery, College of Medicine, Yeungnam University, Daegu, Republic of Korea, ²Regional Center for Respiratory Diseases, Yeungnam University Medical Center, Daegu, Republic of Korea

Yong-Dae KIM

1. 회피요법 알레르기비염의 증상은 항원이 없어지면 사라질 수도 있지만 실생활에서 이러한 항원들로부터 완전히 회피한다는 것은 불가능하다. 하지만 회피요법으로 알레르기 증상을 완화시키고 약물의 사용량을 감소시킬 수 있으며, 임신 중이나 소아에서 항원 노출을 줄임으로써 알레르기질환의 발병률이 감소될 수 있다는 점에서 환경의 조절은 중요하다. 따라서 효과적인 환경조절을 위해서는 환자가 감작된 항원들을 찾아서 그에 맞는 환경조절을 해야 하기 때문에 피부반응검사나 혈액검사 등 항원검사가 선행되어야 한다. 2. 약물요법 알레르기비염의 치료 약제는 크게 비강 내에 국소적으로 투여하는 약제와 경구로 투여하는 약제로 나눌 수 있다. 1. 항히스타민제 2. 항울혈제(decongestant) 2.1. 국소 항울혈제(topical decongestant) 3. 스테로이드제 3.1. 경구용 스테로이드제 3.2 비강내 스테로이드제 4. 류코트리엔 수용체 길항제 5. 기타약제 5.1. 비만세포 안정제(mast cell stabilizer) 5.2. 프로스타글란딘 D2, 트롬복산 A2 수용체 길항제 (prostaglandin D2, thromboxane A2 receptor antagonist) 5.3. Th2 사이토카인 억제제(Th 2 cytokine suppressor) 5.4. 항면역글로블린 E제(anti-IgE) 5.5. 비강내 항콜린제(intranasal anticholinergics) 6. 비강세척 알레르기비염에서 비강세척은 보조적인 치료로 알려져 왔다. 고장성 식염수를 이용한 비강세척 연구에서 비강세척은 비염 증상의 호전과 함께 항히스타민제의 사용을 줄였다 알레르기비염에서 비강세척의 효과는 다양한 염증매개물질을 포함한 점액을 제거하고, 점액섬모운동을 증가시키는 것으로 알려져 있다 3. 면역요법 면역요법은 알레르기의 면역학적 기전을 이용하여 근본적으로 알레르기 질환을 치료하기 위해 고안된 방법이다. 현재 원인 물질의 노출 경로 또는 방법에 따른 다양한 면역 요법들이 시행되고 있지만 현재 주로 시행되는 면역요법에는 피하면역요법

(subcutaneous immunotherapy, SCIT), 설하면역요법(sublingual immunotherapy, SLIT)이 있다. 4. 수술요법 1. 하비갑개 수술 2. 알레르기비염에서의 비중격 성형술 알레르기비염 환자에서 비중격 만곡증이 동반된 경우 하비갑개 성형술과 함께 비중격 성형술을 시행하면 증상 개선이나 원활한 비강내 분무제 투여 등 치료에 도움을 줄 수 있다.

» 14:10-14:30

» 노인성 난청의 진단과 예방, 치료

*Department of Otorhinolaryngology, School of
Medicine, Kyung Hee University*
Sanghoon KIM

Presbycusis is gradual hearing loss in both ears that commonly occurs as people age. Presbycusis is a complex phenomenon characterized by audiometric threshold shift, deterioration in speech-understanding and speech-perception difficulties in noisy environments. Factors contributing to presbycusis include mitochondria DNA mutation, genetic disorders, hypertension, diabetes, metabolic disease and other systemic diseases in the intrinsic aspects. Extrinsic factors include noise, ototoxic medication and diet. However, presbycusis may not be related to the intrinsic and extrinsic factors separately. Presbycusis can greatly affect one's quality of life; impaired hearing restricts communication and untreated presbycusis could result in social isolation and even depression. Current amplification methods related to auditory rehabilitation can provide improved communication ability to users. Nevertheless, only a minority of elderly people with impaired hearing use hearing aids. The purpose of this lecture is to raise the awareness of presbycusis, to update our current understanding of presbycusis with a focus on age-related deficits in auditory and cognitive processing of speech and to explore strategies of prevention, identification, amplification, and aural rehabilitation. The ultimate goal is to improve the quality of hearing health care and the overall quality of life of older adults.

» 14:30-14:50

» 어지럼증의 이과적 원인 및 치료 - 어지럼증 3대 원인

관동대 국제성모병원
김민범

어지럼증은 매우 흔한 증상으로, 많은 환자들이 이로 인해 응급실 또는 외래로 방문하게 된다. 어지럼은 현훈, 불균형, 머리가 텅빈 느낌, 실신 또는 자세불안정 등의 여러 형태로 나타날 수 있다. 그 중 “실제로 움직이지 않는데도 본인 또는 세상이 움직이는 듯한 느낌”으로 정의할 수 있는 현훈은 이과 영역에서 가장 흔한 증상 중 하나로, 대부분 말초평형기관의 질환에 의해 생기며, 발생율이 전체 성인의 1-2%에 달한다.

이런 현훈의 원인은 다양한데, 그 중 소위 이석증으로 알려진 양성 돌발성체위현훈 benign paroxysmal positional vertigo (BPPV) 이 가장 많고, 그 뒤를 전정신경염 acute vestibular neuritis (VN), 메니에르병 Meniere's disease (MD) 등 이 흔한 것으로 알려져 있다. 현훈의 감별질환을 위해서는 과거력, 임상양상 등에 대한 문진이 필수적이며, 이에 더하여 이학적 검사 및 전정기능검사를 시행함으로써 진단을 내리게 된다. 심각한 합병증이 동반될 수 있는 중추성 병변이 의심되는 경우에는 신경학적 검사 또는 자기공명영상 등의 영상학적 검사도 시행될 수 있다.

본 강의에서는 이과분야에서 가장 흔히 접할 수 있는 3대 어지럼증 질환 (BPPV, VN, MD)의 진단과 치료 과정을 소개하고, 임상적으로 중요한 소견들을 정리하여, 현훈 환자의 간호업무에 도움이 되고자 한다.

» 14:50-15:10

» 코막힘 증상의 다양한 구조적 원인 및 치료

*Department of Otorhinolaryngology-Head and Neck
Surgery, Hallym University College of Medicine,
Dongtan Sacred Heart Hospital*
Seok Jin HONG

Nasal obstruction is a common symptom to the otolaryngology clinic. The most common clinical manifestations of obstructions within the nasal cavity are the patient's complaint of congestion, stuffiness, or blockage within the nose. Difficulty sleeping is another common

complaint. The pathogenesis of nasal obstruction may be related to abnormalities occurring with any of the anatomic structures and functions within the nose. Anatomical causes of nasal obstruction include septal deviations, either congenital or acquired, turbinate hypertrophy, or internal or external nasal valve collapse or stenosis and adenoid hypertrophy. Physiological causes of nasal obstruction include allergic rhinitis or nonallergic rhinitis, including inflammatory, infective (viral or bacterial), hormonal, autonomic, drug induced, systemic disease associated, or occupational. It is therefore pertinent to always complete a detailed history and thorough physical examination of each patient to appropriately diagnose the cause of their nasal obstruction. Fraser and Kelly describe 11 points regarding nasal obstruction that should be covered on history: (1) bilateral, unilateral, or alternating obstruction; (2) duration of symptoms; (3) seasonal; (4) associated nasal symptoms; (5) sense of smell; (6) other medical problems; (7) previous nasal surgery or trauma; (8) current and past medication; (9) illicit drug, alcohol, and tobacco use; (10) pregnancy; and (11) work, occupation. Some patients may require further evaluation involving nasal endoscope or diagnostic imaging. Endoscopy should note presence of any polyps, granulomatous disease, abnormalities of middle turbinate or posterior inferior turbinate, postnasal space, postsurgical changes such as adhesion formation or surgical scarring. The treatment of nasal obstruction should target the underlying etiology. Pharmacologic therapy is generally used as first-line treatment for mucosal causes of nasal obstruction. The majority of cases of nasal obstruction are effectively treated with a combination of pharmacologic and surgical therapy. This session will focus on the clinical manifestations, evaluation, and treatment of nasal obstruction.

» 15:10-15:30

» Indications for tracheotomy and its management after procedures

*Department of Otolaryngology Head and Neck
Surgery, The Catholic university of Korea*

Jung-Hae CHO

Tracheotomy is a surgical procedure which consists of making an incision on the anterior neck and opening a direct airway through an incision in the trachea. The resulting stoma can serve as a site for a tracheal tube or tracheostomy tube to be inserted. This procedure is often temporary and reversible if the patient is able to breathe through an unobstructed upper airway. It allows mechanical ventilation via a tracheostomy tube instead of an endotracheal tube. Because of advancements in intensive care and the widespread use of mechanical ventilation, tracheotomy is one of the most commonly performed surgical procedures. Tracheotomy is generally considered when the duration of mechanical ventilation is expected to be prolonged. Other indications for tracheotomy are: bypass of an upper airway obstruction, easier management of secretions, as an adjunct to chest or head and neck surgery. In cases of severe maxillo-facial trauma, tracheotomy is sometimes used to secure an airway where intubation would be difficult or damaging. Tracheotomy is optimally performed under general anesthesia. If necessary, the procedure may be performed under local anesthesia or in an intensive care setting. Tracheotomy holds a complications rate of between 5 % to 40 % depending on study design, patient follow-up, and the definition of the different complications. Death from tracheotomy is caused most often by hemorrhage or tube displacement or obstruction. Routine postoperative care including humidification, and frequent gentle suctioning prevents tube obstruction. For securing tracheotomy tube, the ties should be secured snugly, yet allow passage one finger between the ties and the neck to prevent neck constriction.

Korean
Session

ORLSP Nurse 2

RM 2-4 (Swan)

Chair : 김성현

이비인후과 수술의 이해

» 15:50~16:05

» Surgical treatment of vertigo-related diseases

Department of Otorhinolaryngology, Yonsei University

College of Medicine

Jinsei JUNG

Vertigo is very common disease at any ages with a wide array of etiologies. Especially, otologic etiology is the most common in vertigo. Although most of vertigo-related diseases are treated medically or with help of vestibular rehabilitation, surgical treatment could be an option in specific diseases or intractable cases. For example, Labyrinthine fistula or superior canal dehiscence syndrome needs surgical treatment. In addition, intractable cases of Meniere's disease or benign paroxysmal positional vertigo (BPPV) may be considered as a surgical indication; endolymphatic sac surgery, chemical labyrinthectomy or vestibular neurectomy is worth consideration in Meniere's disease and semicircular canal obliteration is feasible in BPPV. In this presentation, various surgical treatments in vertigo-related diseases will be discussed.

» 16:05~16:20

» Endoscopic skullbase surgery

Department of Otorhinolaryngology-Head and Neck Surgery, Seoul National University College of Medicine, Boramae Medical Center

Seung-No HONG

인체에 수술적 상처를 최소화 하면서 수술 하는 기법, 즉 미세침습 수술이 최근 발전하고 있다. 환자들 역시 이를 통해 수술 후

회복이 빠르고 환자의 고통도 최소화 하여 선호하고 있다. 과거 pituitary tumor에 대해 신경외과에서 주로 행해지던 Transcranial approach는 동반된 complication때문에 transsphenoidal approach가 각광을 받기 시작했고 그 이후로 이비인후과 비강 영역에서 뇌두개저 질환에 대한 진료 영역이 넓어지고 있다. Endoscopic skull base surgery는 두개저에 발생한 다양한 질환을 이전처럼 두개절제술(open craniectomy)을 시행하지 않고 주로 비강을 통해 접근하는 수술기법으로서 종양을 포함한 두개저에 발생하는 다양한 질환의 수술적 치료에 활용되고 있다. 환자의 양측 콧구멍으로 내시경과 미세수술기구를 넣고 내시경 화면을 보면서 병변을 치료하는 방법으로 외부상처가 없고 정상 신경조직의 손상을 최소화하기 때문에 수술로 인한 환자 불편함이 적다. 무엇보다 내시경은 술자에게 넓은 시야를 제공함으로써 기존 현미경 수술의 단점인 수술 시야의 제약을 극복하게 해주었고 술후 합병증을 감소시킬 수 있다. 이러한 면에서 Endoscopic surgery은 점차 두개저 수술의 범위를 확대시켜 나가고 있으며 수술해부학적 인 접근법의 변화로 수술절차 역시 바뀌고 있다. 두개저 내시경 수술이 가능한 질환으로는 뇌하수체 종양, 두개인두중, 뇌수막종, 척색종, 뇌수막류, 연골육종 등이 있으며 이비인후과적 질환으로는 후각신경종양을 비롯한 각종 코의 양성 및 악성종양, 점액종, 뇌척수액누출, 비인강 혈관섬유종 등이 있다. 비강을 통한 두개저의 접근은 그 위치에 따라 Transfrontal, Transcribriform, Transplanum, Transsellar, Transclival approach 등으로 나눌 수 있으며 각각의 방법에 따라 접근할 수 있는 위치가 다르며 고려해야 할 해부학적 구조물이 다르다. 본 강의에서는 전반적인 내시경 두개저 수술에 대한 해부학적 구조 설명과 함께 내시경을 이용한 각 접근법의 특징에 대해서 사례와 함께 살펴보고자 하겠다.

» 16:20~16:35

» Salivary gland surgery (preoperative and postoperative check point)

Department of Otorhinolaryngology-Head and Neck Surgery, Inha University School of Medicine, Incheon,

Republic of Korea

Jeong-Seok CHOI

Preoperative and postoperative management for the patients with salivary gland surgery is crucial for eliminating the patient fear related to surgery, early detecting postoperative

complications and quickly recovering into normal life after surgery. Before surgery, the patients should be checked to see if they are taking medications or health supplements to affect surgery such as bleeding. In addition to the medication list, any inhalers that the patients use, a case for eyeglasses or contacts should be checked. Smoking habit also can be confirmed to block the surgical problems during and after surgery. Bleeding from the wound after surgery is not a common problem, however, it can occur within the first week of surgery. So, it is also important to monitor bleeding of the surgical site through the draining pouch. After surgery, we can detect some swelling of the surgical site over the face, but if there is increasing redness and unexpected swelling, then an infection can be suspected. Facial symmetry should be confirmed. Facial nerve that closes the eyes, wrinkles the nose and moves the lips runs through the middle of the parotid gland. Decreased motion of facial muscles might occur while the nerve recovers from surgery. Nerves that link to the saliva-producing areas in the parotid gland sometimes link with the nerves that control sweating in the skin. This might cause sweating of the skin at meal time. Rarely, a salivary fistula can develop and cause saliva to leak through the skin. If your eye will not shut, then there is a risk of dryness of the cornea of the eye. Artificial tears may be used during the daytime. The ointment can be used whenever the eye feels dry, especially at night. The eyelid may need to be taped shut at night for sleep. The weakness of the lower lip (a lower branch of the facial nerve) occurs in the process of the removal of a submandibular gland. Numbness to the tongue or restricted tongue movement can occur due to the damage of lingual or hypoglossal nerve. The removal of one salivary gland is likely to have an impact on the amount of saliva.

Korean Session **ORLSP_{SLP}**

RM 3-3 (Diamond)

Chair : 손영익

Specialty Care for Voice Disorders:
Special Know-How from High-End Voice Center

» 13:30-13:50

» How to treat persistent vocal nodule in patients with occupational voice abuse

Speech-Voice Center, PRANA ENT Clinic

Cheol-Min AHN

성대결절은 강한 발성, 부적절한 발성으로 인해 성대 막성부 중간 부위에 지속적인 충격이 가해져서 혈관출혈과 부종이 나타나고, 이것은 성대혈관 내압을 증가시켜 염증을 유발시키게 된다. 이로 인해 성대 점막의 고유층 변화가 나타나고, 이런 반응이 반복적으로 지속됨에 따라 성대상피세포의 손상이 나타나면서 결절이 형성된다고 한다. 따라서 근본적인 치료는 이러한 원인을 제거하고, 결절을 제거하여서 정상적인 음성 산출이 가능하고, 재발을 막아 주는 것이다. 가장 근본적인 치료로는 음성치료를 하게 되지만, 음성치료에서도 30%~40% 정도의 치료 실패율이 보고되고 있다. 특히 음성남용을 하는 전문음성사용인에 있어서는 이런 현상이 더욱 심한 편이다. 음성치료에 잘 반응하지 않고 과도한 음성을 사용해야 하는 경우에는 수술을 하지만, 수술을 하더라도 많은 경우에 재발을 하여서, 보다 근본적인 치료가 필요한 질환이다. 이런 부분을 해결할 수 있는 방법으로 정확한 원인을 확인하고, 환자의 발성 기능과 발성 상태를 확인하는 검사와 분석을 통해, 검사 결과에 근거하여 시도하는 개별적인 음성치료가 매우 효과적이고, 성대점막의 부종과 종물의 형성으로 정상 발성이 어려운 경우 성대종물과 부종을 직접 줄일 수 있는 성대스테로이드 주사 치료가 도움을 줄 수 있다. 발성질환이나 신경질환 등으로 인해 성대에 과도한 경련이 유발되거나 성대접촉이 방해될 경우 성대근내보툴리눔독소주입술이 치료 수단이 될 수 있고, 발성 시 성대접촉이 비정상적으로 부족하고 정상적인 발성 기능을 찾아가지 못하는 경우에 성문하부에 사용되는 후두이물주입술 등은 정상 발성을 유도하여 성대결절을 치료하는데 많은 도움을 주게 된다. 이러한 개개의 치료 방법을 성대결절 환자의 상태에 따라 적절하게 복합적으로 사용될 때 그 치료 효과를 보다 높일 수 있다.

» 13:50-14:10

» Appropriate treatment for vocal fold paralysis according to the different situations

Beautiful Voice Clinic
Young-Ho KIM

Once the vocal fold paralysis is confirmed by physical examination including various endoscopy, radiologic examination, voice evaluation and laryngeal electromyography, a certain treatment should be given. Selection of treatment modality depends on the cause of the vocal palsy and the severity of symptoms. Conservative treatment is a priority. When the vocal fold is unilaterally fixed to the paramedian position and the degree of voice disturbance and aspiration is relatively insignificant, the function of the damaged vocal cords may be expected to be restored. And when the damaged vocal fold is not functionally recovered, the compensation of the normal side may be expected. Therefore, we can recommend the patient a simple observation for 6 months to 1 year. Next consideration is the voice therapy, where breathing training aimed at full extension of expiratory voicing should be preceded. The most commonly used methods are push method and the accent method, which induce strong closure of vocal folds by increasing the subglottal air pressure maximally. The advantage of voice therapy is that it provides a satisfactory voice in more than 60% of patients and provides an opportunity to recover spontaneously while avoiding surgical methods. If combined with surgical therapy, voice therapy is preferred to be done before surgery. Surgical treatment involves the procedures which actually reduce the glottal gap. Vocal fold injection is a technique that injects a material in the vocal fold(s), so that can replace the reduced volume caused by atrophy or paralysis of the vocal folds. Before the procedure, it is necessary to confirm whether there is improvement of voice by conservative method such as lateral compression test. The most important aspect of the procedure is precise selection patient who fits the indications. Laryngeal medialization

is the common term used to push the paralyzed vocal folds medially. Type I thyroplasty inserts implants such as silicone, hydroxyapatite, and Gore-tex® through the window of the thyroid cartilage. Arytenoid adduction is a method developed to physiologically complement the closure of the posterior glottal gap. It is a procedure to aim at the anatomical and physiologically normal adduction effect of the vocal cord by pulling the muscular process of the arytenoid cartilage of the paralyzed vocal fold in the direction of the lateral cricoarytenoid muscle. How to set up and choose treatment methods according to the situation will be discussed.

» 14:10-14:30

» How is spasmodic dysphonia treated key points to reduce symptoms and aid communication

Yeson Voice Center
Hyung-Tae KIM

The role of the central nervous system in controlling speech production is very complicated. Recently it is discussed the potential pathophysiology of spasmodic dysphonia (SD). SD is a task-specific focal laryngeal dystonia characterized by irregular and uncontrolled voice breaks that interrupt normal speech flow. Recent studies suggest that SD results from a primary central disturbance associated with dysfunction at high-level cortical signaling, brain stem reflexes, peripheral nerves, muscles, and mucosal actions. The role of the CNS in phonatory physiology can be further elucidated in the context of the evolution of the treatment of SD. Therefore the therapeutic options targeting the central nervous system in SD are being investigated. The effects of drugs that could potentially improve SD voice symptoms by acting like alcohol on the GABAergic transmission is investigated. Botulinum toxin(BoNT) has shown significant efficacy in treating patient's symptoms. BoNT injection induces that modulation of the laryngeal muscle affected the sensory feedback loop and modulation of the central interneurons.

Lastly, a better understanding of the types of receptors and the role they play in laryngeal somatosensory feedback during voice production may provide us with additional knowledge of the exact therapeutic part of BoNT both locally and centrally in treating the vocal symptoms related to SD. Over last 14 years, we have clinically diagnosed over 1700 patients with SD. In this lecture, subsets of a cohort of patients are discussed in detail clinical studies for treatment.

» **14:30-14:50**

» Pearls and pitfalls of singing voice therapy for professional voice users

Boaz ENT Clinic
Jae-Kook OH

일반인들과 성악 대중음악 뮤지컬 등의 노래를 해야하는 가수, 배우들과는 목소리의 중요성이 다르고 목소리가 나빠지는 이유도 다른 경우가 많다. 그러므로 목소리가 나빠졌을 경우 치료에 대한 요구도와 치료 방법도 다를 수 밖에 없다 치료에서 중요한 것은 목소리가 나빠진 원인을 파악하는 과정이며 원인에 따라 다양한 치료 접근이 필요하다 치료 과정에서의 다양한 접근법을 알아보고자 한다

Korean
Session

ORLOP Audiologist

RM 2-2 (Skylark)

Chair : Jun Ho LEE, Seung Hwan LEE

Audiologist Oral Presentation

» **ORLOP Audiologist-01 15:50~16:00**

» Does VEMP response reappear after stapes surgery?

*Department of Otorhinolaryngology, Seoul National
University Bundang Hospital*
**Jeon SEONG, Jae Joon HAN, Jae-Jin SONG,
Byung Yoon CHOI, Ja-Won KOO**

Objectives:In patients with stapes fixation, air conduction vestibular-evoked myogenic potential (VEMP) response is absent or weak. However, in patients with superior semicircular canal dehiscence (SSCD) syndrome, VEMP response is augmented and its threshold is lowered. Such characteristics of VEMP response may take a role in the differential diagnosis of conductive hearing loss (CHL). However, VEMP is not a reliable test in CHL in perspectives of evaluating vestibular function. In this study, we reviewed the VEMP response in patients with stapes fixation and analyzed the change of VEMP response after surgical correction of stapes fixation. The aim of this study is to see if VEMP can provide a reliable result of otolith function in dizzy patients with history of stapes surgery.

Methods:25 ears of 21 patients who underwent stapes surgery and received VEMP test before and after stapes surgery in Seoul National University Bundang Hospital were recruited. A retrospective chart review was performed for the previous medical history, subjective symptoms, surgical findings, and pre- operative and post-operative pure tone audiometry, bone conduction ocular VEMP (O-VEMP) and air conduction cervical VEMP (C-VEMP). **Results:**Although O-VEMP response was present in all 25 (100%) cases, C-VEMP was present in 2 (8%) among 25 cases before the stapes surgery. The preoperative air-bone gap (ABG) was significantly improved after surgery (24.4dB, 5.4dB, respectively; $P<0.01$). After the stapes surgery, C-VEMP response reappeared in 4 (16%) cases postoperatively. For those cases with reappeared C-VEMP response, the improvement of ABG was 22.7 dB, but was not significantly different from the 17.5 dB of others ($P=0.21$).

Conclusions:The C-VEMP response was reappeared only in 6 (24%) cases even after successful surgical correction of stapes fixation. VEMP test may not provide a reliable functional result of otolith function in dizzy patients with history of stapes surgery.

» **ORLOP Audiologist-02 16:00~16:10**

» Evaluation of vestibular-ocular reflex using head impulse testing in patients with BPPV

*Department of Otorhinolaryngology, Gangnam
Severance Hospital, Yonsei University College of
Medicine, Seoul, Korea*

**Ji Hyung KIM, Min Ki KIM, Inon KIM, Min Pyo
HONG, Hye In CHOI, Eun Jin SON**

Objectives:Current pathophysiologic explanation of benign paroxysmal positional vertigo(BPPV) describes the characteristic symptoms are caused by free-floating or dislocated otoconia in the semicircular canals(SCC). It is also assumed that the function of the vestibular receptors in the SCC are intact. The video head impulse test (vHIT) can provide precise information about the vestibulo-ocular reflex (VOR) to stimuli in the high-frequency range. In this study, we aimed to evaluate the VOR function using vHIT in 3 SCCs in BPPV.

Methods:Thirty-five patients clinically diagnosed with BPPV were included. VOR function was assessed using rapid head impulse in the planes of 3 SCC in both directions. Gain and presence of corrective saccades were analyzed for the affected and the normal ears.

Results:The mean gains of VOR during vHIT were within normal range for LSCC plane in both the affected (1.00 ± 0.12) and normal ears (1.07 ± 0.13), but gain was decreased in 9 cases (25.7%) showed decreased VOR gains in the vertical SCC planes. However, there was no significant correlation between the location of assumed canal involvement and vHIT gains ($p > 0.05$).

Conclusions:In patients with BPPV symptoms, the VOR in the horizontal plane measured during rapid head impulses was normal for both affected and normal ears. However, further studies are needed to clarify possible differences among involved SCC, or recurrent BPPV.

» **ORLOP Audiologist-03 16:10~16:20**

» Comparison of ENG and VHIT result on

vestibular neuritis

*Departments of Otorhinolaryngology of Yonsei
University Wonju College of Medicine, Wonju, Korea*

Chun HAN, Young Joon SEO

Objectives:Examination of dizziness and dizziness would be unmistakable to the opinion that accurate questionnaire and physical examination are essential. However, there is a limit to the diagnosis only by this subjective method, so the test methods that can see more objective indicators can provide more important clues. We performed this study to evaluate whether there is a significant relationship between the ENG and VHIT test results of vestibular neuritis. **Methods:**We compared the mean values of these tests among the patients who underwent both ENG and VHIT tests during the year 2016, collecting information from patients who were finally diagnosed with vestibular neuritis. We have made statistical data for 84 patients diagnosed with vestibular neuritis during the year 2016. First, we observed the numbers of overt saccade and covert saccade at CP above 20%, and then compared the warm caloric response maximum velocity with the cold caloric response maximum velocity with or without covert saccade and overt saccade.

Results:We compared the probability that the covert saccade and overt saccade of the VHIT test would appear in groups with CP greater than 20% and less than 20% CP on the ENG test. Statistically significant ($p = 0.02$) covert saccade was higher in the group with CP over 20%, but there was no significant difference in overt saccade ($p = 0.394$). There was a statistically significant difference between the cold and warm responses according to presence or absence of covert Results showed that cold response, $p = 0.012$ & warm response, $p = 0.618$ showed the importance of the covert results in VHIT examinations.

Conclusions:This report demonstrated a significant increase in covert saccades in patients with CP > 20% and showed a correlation between ENG and VHIT tests. In addition, it is shown that the caloric stimulation according to Covert is

significantly different, and the importance of covert result will be emphasized during VHIT test.

» **ORLOP Audiologist-04 16:20~16:30**

» Characteristics and prognosis of tinnitus in acute low-frequency sensorineural hearing loss

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Kangwon National University

Jin-Sook KIM¹, Eun-Sung LEE², Eui-Cheol NAM³

Objectives: Acute Low-frequency sensorineural Hearing Loss(ALHL) is characterized by earfullness, tinnitus and hearing loss restricted to the low frequency regions such as 125, 250, and 500 Hz. The objective was to investigate the characteristics and prognosis of tinnitus in ALHL by analyzing the degree of hearing recovery and tinnitus improvement after treatment. Additionally, tinnitus characteristics were analyzed by assessing tinnitograms and examining correlation between tinnitus improvement and hearing recovery.

Methods: Medical records of 46 ALHL patients were retrospectively observed and analyzed. Among 46 ALHL patients, tinnitus was reported by 34(74.0%) patients. Out of 34 patients who reported tinnitus, 26 patients completed tinnitograms. Two weeks of medical treatment applying oral steroid or diuretics and the crossover treatment was performed for another two weeks. Degrees of tinnitus improvement following the treatment were categorized as 'completely disappeared,' 'partially improved,' and 'persistent.'

Results: After the medical treatment, tinnitus completely disappeared in 19(55.9%), partially improved in 9(26.5%), and persisted in 6(17.6%), indicating improved rate at 82.4%. The frequencies of tinnitus were matched at

frequencies ≤ 500 Hz in 14(53.8%) and at ≥ 2000 Hz in 12(46.2%), forming the lower and higher frequency tinnitus groups. Tinnitus improved rate including completely disappeared and partially improved were 85.7% patients at the lower frequency tinnitus group and 66.7% at the higher frequency tinnitus group, respectively. A significant positive correlation between hearing recovery and tinnitus improvement was observed($r=0.68$). For the lower and higher frequency tinnitus groups, good correlations were also appeared($r=0.74$ and 0.62), showing a little higher correlation for the lower frequency tinnitus group.

Conclusions: Patients with ALHL may complain the high frequency tinnitus although their hearing loss developed in low frequency region. Tinnitus associated with ALHL was successfully treated with applied medications, showing better treatment for the lower frequency tinnitus group. Hearing recovery and tinnitus improvement were significantly correlated.

» **ORLOP Audiologist-05 16:30~16:40**

» The ability to detect fundamental frequency change and emotional state in voice for school-aged normal-hearing children and children wearing cochlear implants

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Sungkyunkwan University School of Medicine,
Samsung Medical Center

Yerin LIM¹, Jae Hee LEE¹, Il Joon MOON²

Objectives: The purpose of this study was to compare the ability of normal-hearing (NH) children and children wearing cochlear implants (CIs) when detecting fundamental frequency changes and identifying emotion in voice.

Methods: Fifteen NH children and 24 children wearing CIs (bilateral CIs=18, unilateral CI=6) participated in this

study. All the CI children were tested with the preferred state of their CI processors. For the detection task of F0 change in voice, unshifted (original) sentences and sentences with F0 upshifted by either 3 semitone (ST) or 6 ST were presented. For the vocal emotion identification task, the three target emotions (angry, happy, and sad) were used. The sentence-in-noise recognition performance was also measured.

Results: When detecting F0 change in voice, the NH children achieved near-perfect performance whereas the CI children performed poorer regardless of the amount of F0 change. For the vocal emotion identification task, the NH children also showed near-perfect performance at identifying angry and sad emotions, yet reduced performance at recognizing happy emotion. In general, CI children identified poorer for all the emotion categories than NH children did. Similar to NH children, the happy emotion was harder to be identified for CI children. The confusion matrix of CI children's response showed that CI children incorrectly responded as angry emotion when happy emotion was presented.

Conclusions: In conclusion, CI children performed worse for both F0-change detection and voice emotion recognition tasks compared to NH children. The CI children with more difficulty in detecting F0 change tended to be poorer at recognizing voice emotion.

Korean
Session

ORLOP SLP

RM 2-3 (White Heron)

Chair : Tack-Kyun KWON, Seung Won LEE

Oral Presentation

» **ORLOP SLP-01 15:50~16:00**

» Clinical application of two-dimensional scanning digital kymography in discrimination of diplophonia

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In-Ho BAE¹, Soo-Geun WANG², Jin-Choon LEE², Eui-Suk SUNG², Seong-Tae KIM³, Hee-June PARK⁴, Geun-Hyo KIM⁵, Soon-Bok KWON⁶

Objectives: The purpose of this study is to investigate the characteristics of diplophonia using the auditory perception and multi-modal simultaneous examination including sound waveform, electroglottography (EGG), digital kymography (DKG), and two-dimensional scanning digital kymography (2D DKG), and to compare the diagnostic accuracy of each method using binary classifier of confusion matrix.

Methods: One nomorphonic male and nine patients with diplophonia were enrolled. A multi-modal simultaneous evaluation system was used to analyze the vibration pattern of diplophonia. The sensitivity, specificity, and accuracy were used for comparison of the various diagnostic methods and discrimination convenience was assessed using duration

of interpretation. Diagnostic accuracy and duration of interpretation were performed by three raters.

Results: There are three types of asymmetric vibratory pattern in diplophonia according to both oscillators vibrating at different frequencies: asymmetry of left and right cords was 5 unilateral palsy, asymmetry of anterior and posterior cords was 2 vocal polyp, and asymmetry of true and false cords was 2 muscle tension dysphonia. The diagnostic accuracy was highest in DKG (94.74%), followed by 2D DKG (92.98%), EGG (80.70%), auditory perceptual evaluation (78.95%) and sound waveform (77.19%). The interpretation time was the shortest in auditory perceptual evaluation (6.07 ± 1.34), followed by 2D DKG (10.04 ± 3.00), EGG (12.49 ± 2.76), and DKG (13.53 ± 2.60).

Conclusions: Various methods for evaluating diplophonia have their advantages and disadvantages. Auditory perceptual judgement was the easiest and fastest method in experienced raters, but diagnostic accuracy was lower than DKG or 2D DKG. DKG and 2D DKG showed nearly similar diagnostic accuracy, but 2D DKG revealed easier in detection of diplophonic patterns. Therefore, 2D DKG was effective in discrimination of diplophonia and expected to be a promising tool for evaluation of vocal fold vibration.

» **ORLOP SLP-02 16:00~16:10**

» Characteristics of sentence and breath pattern in female patients with depression and stress

Department of Otolaryngology-Head and Neck Surgery, College of Medicine, The Catholic University of Korea

**Yeon-Shin HWANG, Mi-Ran SHIM, Go-Eun KIM,
Sang-Yeon KIM, Dong-Il SUN**

Objectives: Voice quality, pitch, loudness, prosody, speed, articulation reflect stress or psychopathologically disturbed emotions. Therefore, these patients are likely to exhibit different utterance characteristics from patients with voice disorders due to organic problems. However, there have

been many studies on vowels and specific numerical values rather than actual sentences. The purpose of this study is to investigate the actual speech characteristics and breathing patterns of sentences in these patients. And we aim to investigate the difference of actual voice characteristics between patients with voice change due to organic problems.

Methods: From November, 2015 to January, 2017, we selected the female 77 patients who scored more than the reference point in the depression questionnaire and presented with voice change and throat discomfort. We examined the minimum & maximum pitch, average & minimum and maximum intensity. And maximum intensity, average pitch, range of pitch, duration of speech, duration of breathing, duration of inspiration, peak airflow rate, breath volume, peak inspiratory flow rate, and inspiratory frequency were compared and analyzed.

Results: The minimum and maximum pitch and intensity were lower than those of the normal group and in word reading and number reading sentence, it appeared lower than normal group. And, duration of breathing and inspiration, peak airflow rate, breathing rate, inspiratory flow rate & frequency were higher than normal group. For patients with psychological problems, the following results were showed: slower rate of speech, decreased length of utterance, increased lengthy pauses, decreased pitch variability, monoloudness frequent use of vocal fry.

Conclusions: It is considered that the possibility of voice change due to psychological problems should be considered first when these patients visited the otorhinolaryngology and examined their utterance characteristics before diagnosis by simple laryngitis.

» **ORLOP SLP-03 16:10~16:20**

» A comparison of psychometric measures among etiological groups of voice disorders

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Otorhinolaryngology, Gangnam Severance Hospital

Seung Jin LEE¹, Sung-Eun LIM², Hong-Shik CHOI¹

Objectives:Beside the Voice Handicap Index, Voice Activity and Participation Profile (VAPP) is one of the recently introduced tools that differentiate between impairment of voice activity and the effect of voice disorder on participation in those activities. The purpose of the current study was to determine whether patients with functional voice disorders show different K-VAPP and VHI profiles from other etiological groups.

Methods:The Korean Version of the VAPP and the VHI was administered to 200 participants (50 for each etiological group, 50 without vocal complaint). The K-VAPP and KVHI subscale scores were compared while controlling for age, professional use of voice, and severity of voice disorder measured by overall severity of CAPE-V.

Results:The functional and neurogenic groups showed higher scores in relation to the control group, while the organic group showed higher scores only for total score ($p=.005$), self-perceived severity ($p<.001$), effect on job ($p=.004$), and effect on emotion ($p=.001$) subscores of the K-VAPP and physical subscore ($p<.001$) of the KVHI than the control group. A comparison among patient groups showed that the functional group showed lower total score ($p=.005$), Participation Restriction Scores ($p=.005$), and effect on daily communication ($p=.005$) score of the K-VAPP, and Emotional subscore of the KVHI than the neurogenic group. Functional group showed higher scores in total score, functional, and physical subscores than the organic group.

Conclusions:Psychometric assessment using the K-VAPP and the VHI could provide clinicians with baseline information. The current results suggest that the KVHI and the K-VAPP are suitable for differentiating psychometric profiles of different etiological groups. Further studies pertaining to the follow-up of the profiles are needed to extend clinical usefulness.

» **ORLOP SLP-04 16:20~16:30**

» Validation of the acoustic voice quality index in the Korean language

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Geun-Hyo KIM¹, Yeon-Woo LEE¹, In-Ho BAE², Hee-June PARK³, Soo-Geun WANG¹, Byung-Joo LEE¹, Wonjae CHA¹, Soon-Bok KWON, PhD⁴

Objectives:The purpose of this study was to explore the concurrent validity of the Acoustic Voice Quality Index (AVQI) in a Korean population. We investigated the feasibility of its cutoff values and diagnostic accuracy in discriminating between normal and dysphonic voices.

Methods:A total of 1,478 native Korean subjects with normal voices ($n = 68$) and with voice disorders ($n = 1,410$) were asked to speak and sustain the vowel “a” and to read the Korean text “Walk” aloud. A 2-second mid-speech portion of the sustained vowel sound and two sentences (with 26 syllables) were edited and concatenated, and the AVQI was calculated. Additionally, two auditory-perceptual assessments, namely the Grade, Roughness, Breathiness, Asthenia, Strain (GRBAS) scale, and the Consensus Auditory-Perceptual Evaluation of Voice (CAPE-V) were used by five speech language pathologists (SLP) to rate the severity of dysphonia.

Results:Both auditory-perceptual assessments showed high confidence levels among the five SLPs. The AVQI correlated with grade (G) and overall severity (OS). There were statistically significant differences in AVQI, G, and

OS between normal and pathologic speech groups. In the receiver operating characteristic (ROC) curve analysis, AVQI, G, and OS cutoff values were <3.46, <0.00, and <25.00, respectively. The ROC curve analysis indicated that AVQI had excellent diagnostic accuracy for discriminating between normal and dysphonic voices (area under the curve: 0.972-0.977).

Conclusions: We demonstrated the concurrent validity of AVQI as a promising tool for assessing overall voice quality and quantifying dysphonia in a Korean-speaking population.

» **ORLOP SLP-05 16:30~16:40**

» **Cepstral spectral and auditory-perceptual evaluation analysis of adductor spasmodic dysphonia**

Department of Otorhinolaryngology-Head and Neck Surgery, Kangbuk Samsung Hospital, Sungkyunkwan University School of Medicine

Jae-Kyung CHO¹, Seung-Ho NOH², Sang-Hyuk LEE³, Sung-Min JIN⁴

Objectives: Adductor spasmodic dysphonia (ADSD) is a neurological disorder characterized by intermittent breaks in voicing associated, strangled harsh voice and dysfluent effortful speech production. The GRBAS scale is a widely used method for auditory perceptual evaluation of voice quality. However, since the auditory perception evaluations are evaluated on the subjective standards of the listener, standardized numerical value cannot be gained. The aim of this study was significant correlation between cepstral and spectral features and auditory perceptual evaluation in speakers with voice disorders.

Methods: From 2016 through 2017, total of 15 patients with ADSD and 15 healthy women (control group) were enrolled. voices were assessed by Analysis of Dysphonia in Speech and Voice (ADSV) and auditory-perceptual evaluation using the GRBAS. All participants were recorded a sustained vowel /a/ for more than 1.5 seconds, which was

recorded and analyzed measuring CPP, L/H ratio, CPP F0 and CSID, and auditory-perceptual ratings were measured using GRBAS.

Results: Patients with ADSD had significantly lower CPP (9.47 ± 2.76), CPP F0 (182.32 ± 39.71) ($p < 0.05$), and significantly higher CSID (23.98 ± 11.89) ($p < 0.001$). But L/H ratio was not found different between two groups with no significant correlation ($p > 0.05$). There was a high correlation between CSID and auditory perceptual parameters such as grade (G) and Strain (S). The result CPP F0 decreased as grade (G), rough (R), and breathy (B) increased. Receiver operating characteristic analysis showed that the threshold of 13.218 for CSID achieved a good classification for ADSD, with 86.7% sensitivity and 93.3% specificity.

Conclusions: By applying cepstral and spectral analysis and identifying the auditory-perceptual features of patients with ADSD. This study demonstrated correlation between cepstral and spectral features and auditory perceptual evaluation in clinical practice.

ORLOP EX

RM 2-5 (Crane)
Chair : Seok Hyun CHO, Sung Il CHO

» ORLOP EX-01 15:50~16:00

» A case series of internal auditory canal diverticulum or cavitary otosclerosis and its audiological association

*Dep. of Otorhinolaryngology, Northwick Park Hospital,
London*

Wei JIA, Arvind SINGH

Objectives: Cavitary otosclerosis or diverticula of internal auditory meatus are rarely described in literature and have been described to be a part of the otosclerosis process or occur independently (1,2). Its clinical relevance is not entirely understood. The aim is to correlate cavitary otosclerosis on computed tomography with audiological tests to identify a clinical significance.

Methods: 13 patients with bilateral otosclerosis were identified (26 temporal bones) through our specialist multi-disciplinary otology radiology meetings with signs of diverticula in the internal acoustic meatus.

Results: 12 temporal bones had cavitations with fenestral disease, which 9 (75%) were mixed hearing loss, 2 (16.67%) were conductive hearing loss and 1 (8.33%) had normal hearing. 9 temporal bones were cavitations with both fenestral and retrocochlear disease, which 5 (55.56%) was mixed hearing loss and 3 (33.33%) was sensorineural hearing loss and 1 (11.11%) was conductive hearing loss. 5 had no diverticula.

Conclusions: Cavitations have been shown to occur independently of otosclerosis and are associated with sensorineural hearing loss. Cavitations appear to contribute to the sensorineural element in otosclerosis, both in fenestral and retrocochlear disease. This study helps to

further understand the significance of this entity.

» ORLOP EX-02 16:00~16:10

» An epidemiological study of ENT emergency admission workload at busy UK hospital

*Dep. of Otorhinolaryngology, Northwick Park Hospital,
London*

Wei JIA, Taranjit TATLA, Ahmed MOHAMMOD

Objectives: Otolaryngology emergencies are common. Most patients presenting as an emergency do not require admission into hospital. This is an epidemiological study of patients requiring admission by the Otolaryngology department.

Methods: This retrospective study reviewed patient records over a 13 months period, obtained from the hospital coding department.

Results: 1368 patients were studied. 53.8% and 46.2% were male and female patients respectively. 84.8% and 15.2% were adult and children admissions respectively. Average length of stay was 2.24 days. 63.3%, 26.17% and 10.53% were head and neck, rhinology and otology admissions respectively. Top three conditions include upper airway inflammatory conditions, epistaxis and otological infections, are responsible for 67.98% of inpatient admissions

Conclusions: The vast majority of admissions are conservatively managed and require no surgical intervention. Inflammatory/Infective conditions represent 55.77% of admissions.

» ORLOP EX-03 16:10~16:20

» The final facial function has a little recovery than expected in the associated loosening of superficial musculoaponeurotic system in facial palsy

*Department Of Otorhinolaryngology-Head And Neck
Surgery, Inje University College Of Medicine, Ilsan
Paik Hospital*

**Hae Dong KIM, Byung Hyun HAN,
Yong Seok JO, Jeon Mi LEE, Jin KIM**

Objectives: In the evaluation of paralytic facial function, House-Brackmann(HB) grading system or Sunnybrook(SB) grading score have been used as a gold standard. However, unlike the result predicted by these systems, we would like to report that even more severe results have occurred in the loosening of superficial musculoaponeurotic system(SMAS) **Methods:** To evaluate associated loosening of paralytic hemi-face, three points as an easily available were recommended to put together with facial function. The level differences on horizontal brow line, lateral canthus, and mouth corner were used for standard tool to analyze the loosening of hemi-face. Consecutive 480 photos of SMAS-injured patients were included in this study for 2 years.

Results: Most of SMAS-injured 40 patients of facial paralysis(level differences>1.34) had result of poor prognosis compared than other SMAS-preserved 40 patients(level differences<1) after 1 year from onset of facial palsy. As worse as the loosening of hemi-face, there had been little or only a slight recovery of facial function. Most of SMAS-injured 40 patients of facial paralysis had facial function of HB 4.4 and SB 34.7.

Conclusions: The final facial results of SMAS-injured paralytic patients were not optimistic than expected by HB or SB systems. It should be considered the preservation or loosening of SMAS layer to manage and predict their facial function.

» **ORLOP EX-04 16:20~16:30**

» Spectrum of otologic diseases related to bilateral enhancement in post gadolinium 3D FLAIR images

*Department of Otorhinolaryngology-Head and Neck Surgery, Seoul National University Bundang Hospital,
Seoul National University College of Medicine,
²Departments of Radiology Seoul National University Bundang Hospital, Seoul National University College of Medicine*

**Jae Jun HAN¹, Ji Young LEE¹, Jeon SEONG¹,
Bong Jik KIM¹, Hye-Rim PARK¹, Yoon Jeong BAE², Byung Yoon CHOI¹**

Objectives: We frequently see sudden sensorineural hearing loss cases with abnormal cochlear enhancement in post gadolinium 3D FLAIR images only in the affected side. However, etiologies of bilateral cochlear enhancement in post gadolinium 3D FLAIR images have not been well documented. Thus, we aim to delineate the spectrum of otologic diseases manifesting high signal intensity in both cochlea in the enhanced FLAIR images to prepare prospectively for the situations when we encounter hearing loss with such radiological findings.

Methods: We were able to recruit 76 patients who showed abnormal cochlear enhancement finding at least in one side on the post gadolinium MRI FLAIR images taken from 2003 through 2017 in Seoul National University Bundang Hospital. Among those, we finally recruited 14 patients with bilateral cochlear enhancement on the post gadolinium MRI FLAIR images and analyzed their clinical phenotypes including hearing status.

Results: Such a bilateral radiological phenotype from these 14 subjects did not necessarily involve bilateral hearing loss. In detail, bilateral hearing loss were noted only from 10 subjects, while there were indeed 4 subjects who had unilateral hearing loss with near normal contralateral hearing. As expected, the etiologies underlying these 10 subjects were rather systemic diseases. In detail, the etiologies included autoinflammatory inner ear diseases, such as CINCA syndrome (n=2), mixed type hearing loss due to autoimmune ANCA associated vasculitis(n=1), bacterial meningoenzephalitis(n=2), myelodysplastic syndrome(n=1), neurogenic syphilis(n=1) and subacute combined degeneration(n=1). 1 subject with CINCA syndrome turned out to have a germline genetic alteration in NLRP3. The remaining 4 subjects with unilateral hearing loss had a history of Meniere disease, vestibulopathy, headache, gestational DM and tonsillitis. Patients with unilateral hearing loss had a tendency to suffer

temporary illnesses compare to those with bilateral hearing loss. The degree of hearing loss and the response to steroids in case of fluctuation or sudden aggravation of hearing varied. Among the 10 subjects with bilateral hearing loss, 7 subjects eventually became deaf. Among the 7 subjects, 2 subjects diagnosed as CINCA syndrome, one had hearing loss when age 10, became deaf after 3-4years, at the time of admission, and the other one was mildly hearing impaired and progressed to deaf for one year. Of the remaining 5 deafs, 2 had post-meningitis deaf, 1 suffered from subacute combined degeneration, and 1 had a family history of hearing loss. 2 subjects visited our clinic with bilateral otitis media, and one of them recovered moderate to severe hearing loss from severe hearing loss after surgical and steroid treatment. The other one improve his hearing from moderate to severe to moderate after antibiotics treatment. They had ANCA associated vasculitis, and myelodysplastic syndrome. Another subject who had neurosyphilis and trigeminal neuralgia had bilateral sudden onset of hearing loss with different timing, while one side became deaf but the other side recovered to normal after steroid treatment. Among 4 patients of unilateral hearing loss, two of whom had low frequency hearing loss, but had improved after steroid treatment. The other one had a history of Meniere and vestibular neuritis 20 years ago and did not improve on steroid therapy. The last one suffered from gestational DM, treated with steroids, but aggravated to severe hearing loss. Final definitive etiologic diagnosis was not made at the time of MR imaging in 3 of these 14 cases.

Conclusions: When we encounter bilateral cochlear enhancement on MRI FLAIR images, certain systemic diseases should be preferentially included for differential diagnosis. This MRI finding could potentially provide a strong clinical clue to elicit a series of downstream laboratory tests including genetic testing or serologic testing that are mandatory for customized and timely diagnosis/management of these subjects.

» **ORLOP EX-05 16:30~16:40**

» A survey on the knowledge, attitude, and

practices towards epistaxis of patients in a tertiary government hospital

*Department of ENT-HNS, Ospital ng Maynila Medical
Center*

**Arlene R. FERNANDEZ, MD, Victor ALARVA III,
MD, FPSO-HNS**

Objectives: Epistaxis is the most common otolaryngologic emergency. Fortunately, almost 90% may be controlled by applying first aid measures. Although the prevalence of epistaxis is high, the public has limited knowledge on first aid intervention. This study aims to measure the level of knowledge, attitude, practices of patients and their caregiver seen by the Department of Otorhinolaryngology in a Tertiary Government Hospital in Manila.

Methods: This is a perspective descriptive study which uses set of questions that will measure the knowledge, attitude, and practices of patients and caregivers towards epistaxis. A total of 163 respondents were interviewed by resident physicians for uniformity and proper conveying of questions in native language.

Results: Results showed that their knowledge of the cause and correct management of epistaxis is low. Only 7.4% answered the correct combination for first aid management which includes nose pinching and leaning forward. On knowledge of prevention avoiding hot weather was the highest which was parallel to the respondents perception of the major cause of the epistaxis. The attitude of respondents towards epistaxis were high, 89% answered that it is necessary to stop epistaxis by applying intervention. Lastly, for their practice on the management of epistaxis, the combination of pinching the nose on the ala part and head downward were correctly answered by only 6.7%.

Conclusions: This study revealed the low knowledge and practices of patients and caregivers towards epistaxis. The attitude towards epistaxis of the respondents is high which demonstrates they are keen to learn and may have a good reception to educational material that may be presented to them to increase their awareness towards epistaxis. This may

help to decrease the number of medical consults and to lessen the morbidity of incorrect management of epistaxis.

» **ORLOP EX-06 16:40~16:50**

» Human upper airway microbiome of chronic rhinosinusitis in unilateral diseased sinus:A controlled paired analysis

¹Department of Otorhinolaryngology-Head and Neck Surgery, Hallym University College of Medicine, Dongtan Sacred Heart Hospital, ²Hwaseong Hallym University Sacred Heart Hospital

Seok Jin HONG¹, Joong Seob LEE², Seung Sik JEON¹, Il Seok PARK¹, Yong Bok KIM¹, Seok Min HONG¹, Heejin KIM¹, Sung Kyun KIM¹

Objectives:The human microbiota is the aggregate of microorganisms, and the bacterial microbiome of the human digestive tract contributes to both health and disease. In health, bacteria are key components in the development of mucosal barrier function and in innate and adaptive immune responses, and they also work to suppress establishment of pathogens. In human upper airway, the sinonasal microbiota might play an important role in chronic rhinosinusitis(CRS). The purpose of this study is to investigate the human upper airway microbiome in CRS patients, and to compare the sinonasal microbiome of unilateral diseased sinus with contralateral nondiseased(control) sinus.

Methods:A total of 20 samples from 10 unilateral CRS patients (aged 17 to 67, Group1 ; 10 unilateral diseased sinus, versus Group 2; 10 contralateral nondiseased sinus) were examined. Swabs were collected from the middle meatus and/or anterior ethmoid region under general anesthesia during endoscopic sinus surgery. After DNA extraction from swab samples, we analysed bacterial microbiome consortia using 16s rRNA gene sequencing approach(the Illumina MiSeq platform).

Results:In this study, relatively abundance of the six bacterial phyla and tremendous genus and species

found in the individual sinus swab samples, include Corynebacterium, Staphylococcus, and Streptococcus species. Anaerobes like Fusobacterium, Bacteroides, and Propionibacterium were present in both group. No difference was seen for richness or diversity between study groups($p>0.05$). In genus, Corynebacterium was the most common CRS microbiome, and Staphylococcus was 2nd most prevalent genus in both group.

Conclusions:Our results show the diversity of human upper airway microbiome, and the findings will suggest that CRS is a polymicrobial infection. The Corynebacterium and Staphylococcus may live as commensals on mucosal surfaces of sinus in the upper respiratory tract. The further study will be needed for analysis of microbiome-human interactions in upper airway and CRS.

» **ORLOP EX-07 16:50~17:00**

» Results of studying polymorphism of genes VEGF-A and NOS-3 in blood of patients with nasopharyngeal angiofibroma

*Tashkent Institute of Postgraduate Medical Education,
Tashkent, Republic of Uzbekistan*

OB ABDURAKHMANOV, DK DZHABBAROV, MA GAFUR-AKHUNOV, AE KENGBAYEV

Objectives: Juvenile nasopharyngeal angiofibroma (JNA) is a benign tumor that presents in adolescent males. JNA tumors are composed of fibroblasts and vascular endothelial cells. We identified typical polymorphic markers: factor VEGF-A: C963T, G405C,-1154A and nitroxy synthetase 3 (NOS- 3): T786C expression in JNA. We hypothesized that a combined analysis of several genetic markers - G405C of gene VEGF-A and T894G, T786C of gene NOS-3 may improve the efficacy of early diagnostics and formation of risk groups of people.

Methods:Presents the analysis of results of genetic markers in 40 patients and 20 practically healthy adolescent boys who were presented for gene VEGF- A (C963T, G405C and G1154A) and gene NOS-3 (T786C and T894G).

Genetic markers were determined with a method of pyrosequenation with utilisation of a system for genetic analysis of PyroMark series.

Results: The analysis of the data demonstrated that patients sometimes had a CC genotype when genetic marker C 963T was analysed, whereas this genotype was not found in practically healthy people. G405C marker of gene VEGF-A in a group of patients there was an increased frequency of occurrence of genotype CC (40.0%) in comparison with a control group (15.0%). In case of study of G-1154A polymorphism a reduction (10.0%) in occurrence of genotype AA and a rise in a number of detection of genotype GG (50.0%) was observed in a group of patients in comparison with the control (30.0% and 10.0%, respectively). The analysis NOS-3 of the data showed that in analysis of genetic marker T786C patients sometimes had genotype CC whereas this genotype was not found out in practically healthy people. Analysis of genetic marker T786C of gene NOS-3 was T/T=0.6, T/C=0.35, C/C=0.05; in the control group it was T/T=0.81, T/C=0.18, C/C =0.01. A frequency of distribution of genotypes according to HWB in a group of patients was T/T =0.65, T/C =0.25, C/C =0.1 ($\chi^2=1.6$; $P=0.2$); in a group of healthy blood donors it was T/T =0.80; T/C=0.20, C/C =0.0 ($\chi^2=0.2$; $P=0.6$). Genetic marker T894G of gene NOS-3 an expected frequency of distribution of genotypes in a group of patients was T/T =0.46, T/G =0.4, G/G =0.11; in the control group it was T/T=0.68, T/G=0.29, G/G =0.03. An observed frequency of distribution of genotypes in a group of patients was T/T=0.40, T/G=0.55, G/G=0.05 ($\chi^2=0.1$; $P=0.8$); in a group of healthy donors: T/T=0.65, T/G=0.35, G/G=0.0 ($\chi^2=0.9$; $P=0.3$). No reliable differences in determination of heterozygotes among the groups studied were found: both in the experimental and control groups a number of heterozygotes varied within 18-35%, the greatest number of heterozygotes was observed during analysis of genetic marker T894G (40-50%) in patients.

Conclusions: Thus, the studies showed good prognostic efficacy of genetic marker G405C of gene VEGF-A in

patients with JNA. Expediency of a combined analysis of several genetic markers - G405C of gene VEGF-A and T 894G, T786C of gene NOS-3 was also demonstrated for enhancement of efficacy of early diagnostics and formation of risk groups of people.

OTPP I

RM 1-2 (Exhibition Hall B)

Chair : Kyu-Yup LEE

Basic Research

» OTTP-01 15:50~16:00

» Designing an animal model for stress-induced hearing loss

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Yeong Cheol KIM^{1,2}, Jong Ju LEE¹, Young Sun KIM¹, Yeon Ju KIM¹, Yun Yeong LEE¹, Oak-Sung CHOO¹, Beomyong SHIN^{1,2}, Mi-Jin CHOI^{1,2}, Jeong Hun JANG¹, Yun-Hoon CHOUNG^{1,2,3*}

Objectives: Stress is one of the causes for sensorineural hearing loss (SNHL). However, there is no particular animal model for this condition. Thus, it is rather difficult to identify the mechanism, and discover drug targets for therapeutic intervention. The purpose of this study was to develop a stress induced SNHL animal model.

Methods: Two different stress models were designed for stress induced SNHL. The protocol for stress included swimming, overcrowding, shaking, shaking with heating, saline injection, social isolation and cold stimuli. All experiments were conducted in a certain time schedule; stress activities started at 9 A.M and activities started at 2 P.M. For stress model #1, a two week-protocol was repeated twice for a total of 4 weeks. For stress model #2, different

stress activities were scheduled for a total of 6 days. With the stress protocol, hearing status was measured by auditory brain stem response (ABR) test. For the final step, the SD rats were treated with dexamethasone (DEX). They were divided into 3 groups: (1) control, (2) Stress control, (3) DEX.

Results: ABR thresholds significantly increased at 16 kHz. Also, significant values were noted from 2 weeks to 4 weeks of stress at 16 kHz in model #1. Also, threshold values significantly increased at 16 kHz and 32 kHz in post stress day 1 and day 7 in model #2, respectively. ABR thresholds of stress animal model #2 including steroid therapy. In group 3, hearing thresholds were significant with 7 days of DEX IP injection after the stress protocol was complete at 16 kHz.

Conclusions: From our study, we were able to design an accurate animal model for stress induced SNHL. Comparing the 2 stress models, higher levels of hearing loss were evident in stress model #2, possibly indicating optimal experimental conditions. Furthermore, preliminary evaluation of steroid effects showed positive results of hearing recovery. To confirm this data, longer periods of studies with various doses and injection types of steroid therapy will be required.

» OTTP-02 16:00~16:10

» The effect of atorvastatin on hearing impairment in diabetic mice

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Yun Yeong LEE¹, Oak-sung CHOO¹, Mi-Jin CHOI^{1,2}, Yun-Hoon CHOUNG^{1,2*}

Objectives: Atorvastatin (As), a synthetic HMG-CoA reductase inhibitor used for the treatment of hyperlipidemia, significantly lowers plasma cholesterol

and low-density lipoprotein cholesterol. The action of As in diabetes mellitus (DM) related hearing impairment is still under debate. The aim of this study is to investigate the effect of As in HF/F-diet-induced diabetes-associated hearing impairment using C57BL/6 mice.

Methods:C57BL/6J mice were assigned to normal and diabetic group. They were then divided into the following subgroups: normal, HF/F-diet with vehicle or atorvastatin. We established a diabetic model at 12 weeks followed by statistically significant difference in blood glucose, intraperitoneal glucose (IPGTT), insulin tolerance (IPITT), and serum lipid level. Vehicle or atorvastatin (20 mg/kg) were injected via intraperitoneal injection (IP) every other day from week 12 to 16. We analyzed 1) body weight, 2) Blood glucose, IPGTT and IPITT, 3) ABR measurement at 16, 32 kHz pre and post-16 weeks. Mice were sacrificed at week 17, and 4) serum lipid, 5) histology, and 6) Immunohistochemistry (IHC) were analyzed.

Results:The pre-medication ABR results showed normal hearing in all mice. After 16 weeks, increase in ABR threshold were noted in the HF/F diet with vehicle, and hearing preservation were noticed in the atorvastatin group. Moreover, increased body weight, blood glucose, serum lipid, liver fat storage, IPGTT, and IPITT were all improved by atorvastatin. From histological analysis, nuclear alterations of spiral ganglion neuron (SGN) and swelling of stria vascularis (SV) were preserved by atorvastatin. Also, immunofluorescence analysis showed that atorvastatin was able to decrease the DHE fluorescence at organ of Corti, and the Tunnel fluorescence at SGN and SV.

Conclusions:Atorvastatin could be a major mediator for prevention of DM mediated hearing impairment by decreasing ROS along with inhibiting cell death through lowering of body weight, serum lipid, glucose and liver fat storage.

» **OTPP-03 16:10~16:20**

» **Comparing the vasculature of the central nervous system in six murine species**

¹Department of Medical Genetics, College of Medicine, Hallym University, Chuncheon, Republic of Korea, ²School of Medicine, George Washington University, Washington Dc, Usa, ³Department of Anatomy And Neurology, College of Medicine, Hallym University, Chuncheon, Republic of Korea, ⁴Department of Otorhinolaryngology-Head And Neck Surgery, College of Medicine, Hallym University, Chuncheon, Republic of Korea

Yoo Yeon KIM¹, Janet Ren CHAO², Tae-Cheon KANG³, Jiwon CHANG⁴, Jun-Gyo SUH¹, Jun Ho LEE⁴

Objectives:The purpose of the present study was to define the CNS vascular anatomy. Formaldehyde perfusion via pumping system, and followed Formaldehyde mixed with Alcian blue, were best staining methods to identify accurate vascularity in CNS. Specially, the staining periods and fixative mixing timing induced variable staining results. Suggesting results of present study might be helpful to modulate the proper modeling of brain ischemia or infaction.

Methods:We used six different types of adult male animals including Korean wild mouse, mice, rats, mongolian gerbils, hamsters, and guinea pigs. To stain the blood vessels in each of the animals, Alcian blue reagent was used to perfuse each species. After removing of all skull, nasal vault was removed until nasal tip. Next, occipital bone was removed and extended to coccyx area.

Results:Posterior circulation to brain (from vertebrate arteries to 'circle of Willis'): all experimental models showed good staining. Ventral portion of spinal cord: anterior spinal arteries were shown. Most species had hexagonal "circle of Willis", except KWM (absent of posterior communicating arteries), gerbil (multiple vascular network between CCA and basilar artery), guinea pig (trophy shape due to unusual

CCA position). anterior spinal arteries were anastomoses with anterior spinal medullary arteries, several times during vessel running. In gerbil and Hamster, running artery was pulled to anterior spinal medullary artery

Conclusions: In present study, we supposed vascular interaction between 'circle of willis' and pituitary glands. We suggesting new arterial supplying pathways, elect the preliminary concepts for role of 'circle of willis', and evaluating method of variable CNS patho-physiology.

» **OTPP-04 16:20~16:30**

» **Effects of hypergravity on gene expression of serotonin receptors of vestibular nuclei in rats**

*Department of Otorhinolaryngology, Inha University,
College of medicine, Incheon, Korea*

Hyun Ji KIM, Eun Hae JEON, Kyu-Sung KIM

Objectives: Motion sickness occurs as a result of a mismatch or conflict between the information arising from the vestibular system, the visual and proprioceptive inputs. Many different environments can cause motion sickness including travelling on land, sea or space. The activation or blockade of serotonin receptors is known to be closely related with migraine and motion sickness. In this study, we investigated the effects of hypergravity on vestibular function using VOR analysis and changes of gene expression of serotonin receptors in vestibular nuclei.

Methods: Using an animal rotator, we assessed the vestibular function (recording the eye movement) after hypergravity loads (4G for 24hrs, 4weeks) in rats (aged 7-8weeks, weighing 250-300g). We estimated the VOR responses, gain, asymmetry and phase at 0.04, 0.08, 0.16, 0.32Hz on earth vertical axis rotation. And we also checked the recovery of the VOR response after stopping the hypergravity stimulation. We investigated the effects of the centrifugation-induced gravity changes on gene expression of serotonin receptors (5HT1B, 5HT2A, 5HT1D, 5HT1F) in vestibular nuclei.

Results: Under 4G for 24hrs stimulation for 4weeks, the

gain at 0.04, 0.08, 0.16, 0.32 HZ were 0.463 ± 0.113 , 0.524 ± 0.455 , 0.494 ± 0.093 , 0.509 ± 0.198 respectively. They showed significant reduction on VOR gain compared to the control group. Decreased VOR gains were recovered to normal range on 3-4days after stopping the hypergravity stimulation. 5-HT_{2A} expression was increased in the vestibular nuclei. Exposure to 4G for 4weeks showed differential modulation of gene expression of serotonin receptors in vestibular nuclei.

Conclusions: By observing the data, hypergravity stimulation affect the vestibular function and modulation of gene expression in vestibular nuclei. We can induce the results that long-term hypergravity stimulation causes remarkable changes on VOR gain in rats. And this altered gravity also induced differential modulation of several target gene expression in vestibular nuclei in rats.

» **OTPP-05 16:30~16:40**

» **The study for score classification in berg balance scale using inertial sensors**

¹School of Electronic/Electrical Engineering, Inha University, ²Department of Rehabilitation Medicine, School of Medicine, Inha University, ³Department of Otolaryngology, School of Medicine, Inha University
Sang Pyo HONG¹, Yeon Wook KIM¹, Woo Hyung CHO¹, Kyung Lim JOA², Han Young JUNG², Kyu-Sung KIM³, Hyun Ji KIM³, Sang Min LEE¹

Objectives: In this paper, we present the score classification accuracy of BBS (Berg Balance Scale) which is the most commonly used balance evaluation tools using machine learning.

Methods: Data acquisition was performed using the Noraxon system and an inertial sensor of Noraxon system was attached to the body in 8 locations (left and right ankle, left and right upper buttocks, left and right wrists, back, forehead). Based on the 3-axis accelerometer of the inertial sensor, the feature vector STFT (Short Time Fourier Transform) and SAM (Signal Area Magnitude) were

extracted.

Results:The items of the BBS were divided into static movement and dynamic movement depending on the operation characteristics, and the feature vectors were selected according to the sensor attachment positions which affect the score for each item of the BBS. Feature vectors selected for each item of BBS were classified using Gaussian Mixture Model.

Conclusions:As a result of the accuracy calculation for 40 subjects, 55.5%, 72.2%, 87.5%, 50%, 35.1%, 62.5%, 43.3%, 58.6%, 60.7%, 33.3%, 44.8%, 89.2%, 51.8%, 85.1%, respectively

OTPP II

RM 1-2 (Exhibition Hall B)

Chair : Hwan Ho LEE

Exe Otitis Media & Cholesteatoma

» OTTP-06 15:50~16:00

» Comparative efficacies of topical antiseptic eardrops against biofilms from methicillin-resistant *Staphylococcus aureus* and quinolone-resistant *Pseudomonas aeruginosa*

Department of Otolaryngology-Head and Neck Surgery, Chosun University College of Medicine

**Yoon Sik PARK, Jeonghyun OH, Yeon Hoo KIM,
Nam Yong DO, Sung Il CHO**

Objectives:The present study aimed to compare the antibiofilm activities of four commonly available antiseptic eardrops against biofilms from methicillin-resistant *Staphylococcus aureus* (MRSA) and quinolone-resistant *Pseudomonas aeruginosa* (QRPA) in vitro.

Methods:The antibiofilm activities of 50% Burow's solution, vinegar with water (1:1), 2% acetic acid solution, and 4% boric acid solution were evaluated using biofilm

assays. Additionally, the antibiofilm activities of the four antiseptic solutions against tympanostomy-tube biofilms were compared using a scanning electron microscope.

Results:The inhibition of biofilm formation from MRSA and QRPA occurred after treatment with 4% boric acid solution, 2% acetic acid solution, and vinegar with water (1:1). However, 50% Burow's solution did not exhibit effective antibiofilm activity.

Conclusions:Our results indicated that 4% boric acid solution and vinegar with water (1:1) were potent inhibitors of biofilms from MRSA and QRPA and provided safe pH levels for avoiding ototoxicity.

» OTTP-07 16:00~16:10

» Clinical characteristics of pediatric external auditory canal cholesteatoma

Department of Otolaryngology, Chonnam National University Medical School

**Jong-Min PARK, Chul-Ho JANG, Young-Yoon KIM, Jong-Yuap SEONG, Sung-Hoon KANG,
Yong-Beom CHO**

Objectives:External auditory canal cholesteatoma (EACC) is caused by an invasion of squamous tissue into a localized area of periosteitis in the bony canal wall. The clinical characteristics of pediatric EACC are still unknown because of its rare occurrence. To date, only a single paper has reported that pediatric EACC has a less aggressive growth pattern compared to adult EACC. Further studies are required to understand the clinical behavior of EACC, i.e., its aggressiveness. The purpose of this study was to evaluate the clinical characteristics of pediatric EACC.

Methods:The clinical records of all patients diagnosed with EACC in our department from January 1, 2012 to February 29, 2016 were retrospectively reviewed, focusing on the extension of bone erosion, symptoms, and clinical findings.

Results:Seven patients had primary pediatric EACC (age range, 5-17 years). All patients showed unilateral

EACC. Otolgia and intermittent otorrhea were common symptoms. Bacterial cultures were performed for four patients with otorrhea, which was controlled by diluted vinegar irrigation with a topical antibiotic solution. The most common bone destruction sites were the inferior and posterior walls. All patients required surgical treatment. Four patients (patient nos. 1, 3, 4, and 5) were treated via a postauricular transcanal approach. Three patients (patient nos. 2, 6, and 7) required mastoidectomy.

Conclusions: Pediatric EACC is not less aggressive than adult EACC. Therefore, early diagnosis and adequate treatment are necessary. Further studies are required to elucidate the clinical features of pediatric spontaneous EACC.

» **OTPP-08 16:10~16:20**

» Evaluation of lateral semicircular canal function in patients with chronic otitis media by video head impulse test

*Dep. of Otorhinolaryngology, King Chulalongkorn
Memorial Hospital*

**Patcharaorn LIMKITISUPASIN, Permsarp
ISIPRADIT**

Objectives: To assess lateral semicircular canal function at high frequencies in patients with chronic otitis media (COM) by video head impulse test (vHIT)

Methods: This was cross-sectional study performed at King Chulalongkorn Memorial Hospital. Twenty-one patients (twenty-five affected ears) with COM participated in this study. The outcome measures included symptom, microscopic exam, audiogram, bedside tests and horizontal vestibulo-ocular reflex (HVOR) gain from vHIT.

Results: Mean HVOR gain of affected side and unaffected side were 0.9396 ± 0.124 and 0.9371 ± 0.096 , respectively. HVOR gain abnormalities were reported only 2 affected ears (8%), one of these was unilateral COM and gain asymmetry was defined abnormal (10.18%). There was no statistically significant difference in abnormal

HVOR gain between affected and unaffected sides ($p = 0.506$). Among the 21 patients, 2 patients had complaints of dizziness/vertigo, although these patients had normal HVOR gain.

Conclusions: To our knowledge, COM was related to inner ear impairment, including vestibular function. Many tools were used to evaluate lateral semicircular canal function, some of which are caloric test for very low frequency and rotatory chair testing for low- mid frequencies. However, the result of this study suggested no abnormalities of lateral semicircular canal function at high frequencies that similar to daily head movement frequency demonstrated by vHIT. The frequency specific of vestibular compensation in long standing-COM might be explained this result.

» **OTPP-09 16:20~16:30**

» Effect of middle ear gelfoam packing on hearing and healing process after tympanoplasty: A prospective randomized case control study

*Department of Otolaryngology-HNS Seoul St Marys
Hospital The Catholic University of Korea, College of
Medicine*

**Jung Ju HAN, Jung Mee PARK, Yahya, So
Young PARK, Shi Nae PARK**

Objectives: Absorbable gelatin sponge (Gelfoam) is commonly used in middle ear surgery for hemostasis and flap stabilization. This prospective randomized controlled trial (RCT) was performed to compare the surgical outcomes of our swing-door overlay tympanoplasty in patients with chronic otitis media (COM) according to the surgery with or without gelfoam packing

Methods: Fifty seven patients with COM who underwent modified overlay tympanoplasty by one surgeon (S.N.P) in a tertiary referral center between June 2015 and May 2016 were enrolled in this study. They were randomly divided into gelfoam packing group (GPG) and non-gelfoam packing group (NGPG) and the data of 30 patients of GPG and 27 patients of NGPG were prospectively collected

and compared. Sequentially measured post-operative fascia edema, otorrhea, degree of neo-drum epithelization, lateralization, anterior wall blunting, change of air-bone gap (ABG) and other clinical were observed and statistically compared between two groups

Results: Patients were aged between 10 and 81 years with the mean age of 51.5 years. There were no significant differences of various clinical parameters between two groups, except the site of surgery. ABG measured at postoperative 2 month was the significantly smaller in NGPG than GPG ($P < 0.05$). NGPG also showed the statistically better healing process compared to GPG; the earlier epithelialization and less fascia edema in NGPG than in GPG ($P < 0.05$). The final graft uptake rate was not different (100 - Vs. - 100% at postoperative 3 months) in both groups.

Conclusions: Swing-door overlay tympanoplasty showed the good surgical outcomes in terms of graft uptake rate regardless of gelfoam packing. However, our prospective RCT study shows the better hearing and faster healing process in NGPG, which indicate that the gelfoam in the middle ear may interfere with healing process of neodrum and the rapid hearing recovery. NGP seems to have superiority in swing door overlay tympanoplasty.

» **OTPP-10 16:30-16:40**

» Minimally invasive transcanal myringotomy for pediatric early stage congenital cholesteatoma

*Department of Otolaryngology, Chonnam National
University Medical School*

**Jaegu KIM, Chul -Ho JANG, Eun-Kyung JUNG,
Chung-Man SUNG, Seung-Beom KIM, Yong-
Beom CHO**

Objectives: Recently, minimally invasive transcanal myringotomy (MITM), which is a useful surgical technique for early stage congenital cholesteatoma (CC) in children, was introduced. The purpose of this study is to evaluate the short-term surgical results of MITM in pediatric early stage

CC.

Methods: We retrospectively reviewed the charts of 24 patients who underwent MITM between January 2013 and October 2015.

Results: The patients' ages ranged from 1 to 16 years (mean, 2.6 years). There were 17 male and 7 female patients. The right side ($n = 13$) was affected twice as often as the left side ($n = 11$). The most common site was the anterosuperior quadrant (15 cases). The diameter of the CC on axial computed tomography images ranged from 2.8 to 5.7 mm (mean, 3.9 mm). CCs were graded according to Potsic's system: 18 cases were classified as stage I, 3 case as stage II, and 3 cases as stage III. All CCs except 1 were closed type. In 21 patients, the tympanic membrane closed naturally without recurrence. Three patients showed small persistent dry perforation. Natural closure occurred in these patients, who were treated with paper patches.

Conclusions: MITM is a simple, effective technique for removing an early stage CC from the middle ear, and it can minimize operative time, length of hospitalization, and postoperative morbidity.

OTPP III

RM 1-2 (Exhibition Hall B)
Chair : Chang Gun CHO

Inner Ear Disease

» **OTPP-11 15:50~16:00**

» Necessity of admission to improve the hearing-recovery rate in idiopathic sudden sensorineural hearing loss

*Department of Otorhinolaryngology-Head and Neck
Surgery, College of Medicine, Hallym University,
Chuncheon, Republic of Korea*

**Min Jae KIM, Kyung Wook HEO, Pil Hyun JEON,
Jae Jun LEE, Jun Ho LEE**

Objectives:The purpose of this study was to determine the prognostic potential of admission of a patient for idiopathic sudden sensorineural hearing loss (ISSNHL).

Methods:We conducted a retrospective study of 301 patients with ISSNHL. The patients were divided into a study (57 patients at out-patients department (OPD) based treatment, using systemic steroids and intra-tympanic (IT) steroid injection) and a control groups (301 patients at admission, using systemic steroids and IT steroid injection). We compared the success rate (15 dB cut off), Siegel's criteria and hearing gain decibels between two groups

Results:The overall recovery rate of the OPD based treatment group (29.8%) was poor than that of the admission group (52.9%) ($p=0.002$). The odd ratio of OPD based treatment factor was 2.035 when the OPD based treatment and poor prognostic factors were analyzed at logistic regression test (Duration of delayed treatment, 1.073; average hearing loss level, 0.972) ($p=0.041$).

Conclusions:Admission must be strongly recommended when the patients with ISSNHL asked about the necessity of admission. We hypothesized that resting, getting out of their social stress, and relief of anxiety might be helpful to their hearing recoveries.

» **OTPP-12 16:00~16:10**

» **Correlation of cognitive and tinnitus characteristics in aged patients with chronic tinnitus**

Department of Otolaryngology, Seoul National University, Boramae Medical Center

Sang Yoon HAN, Ye Ji SHIM, Young Ho KIM

Objectives:The prevalence of tinnitus is known to increase as the age increases. However, it is not certain if cognitive changes in aged tinnitus patients may affect the severity of their tinnitus. The aim of this study is to investigate cognitive and psychological characteristics in patients suffering from chronic tinnitus and speculate relationship between tinnitus and mild cognitive impairment (MCI).

Methods:From Mar 2017 to Jan 2018, 68 patients aged 50 years or older who had tinnitus > 3 months were enrolled in this study. Patients with history of neuropsychiatric or brain diseases, brain surgeries, and recent alcohol or drug abusers were excluded. Cognitive and psychological function was evaluated by Montreal Cognitive Assessment (MoCA). Patients were allocated to the following groups depending on whether the MoCA score is over 23 points or not; "MCI (-) and MCI (+)". Hearing and tinnitus were evaluated by pure tone audiometry (PTA), speech audiometry (SA), tinnitogram, tinnitus handicap inventory questionnaire (THI) and visual Analogue Scales (VAS).

Results:Among 68 patients, 13 (20.6%) patients had MoCA score under 23. Gender, laterality, and symptom duration had no difference between two groups. The median age was significantly different between two groups ($p=0.005$). The median threshold of PTA showed no significant difference between two groups ($p=0.071$). SA, THI, and VAS also showed no difference between groups. However, the median loudness on tinnitogram in MCI (+) group had a significant increase compared to MCI(-) group (MCI (+) 56(0-98)dB; MCI(-) 25(0-118) dB) ($p=0.016$). Age, PTA, and tinnitus loudness were assessed in the generalized linear model in which none of them showed statistically significant differences between two groups.

Conclusions:Old aged tinnitus patients with the possibility of MCI revealed a significant increase of tinnitus loudness on tinnitogram. However, to speculate the correlation between cognitive function and tinnitus characteristics, further studies are needed.

» **OTPP-13 16:10~16:20**

» **Who will benefit from multiple intratympanic dexamethasone injection in sudden sensorineural hearing loss**

Department of Otorhinolaryngology-Head and Neck Surgery, Korea University Ansan Hospital

Jihye RHEE, Ji YANG, Kukjin NAM, Kang-Hyeon LIM, June CHOI

Objectives:To evaluate the usefulness of intratympanic dexamethasone injection (ITDI) in different severity of hearing impairment according to the number of procedures.

Methods:Sudden sensorineural hearing loss patients who underwent systemic steroid therapy and ITDI was enrolled. According to the number of ITDI, they were divided into group 1 (1-3 times of ITDI) and group 2 (more than 4 times of ITDI). Medical chart review was conducted including the factors which can affect the number of operations, such as prevalence of common underlying diseases, smoking, accompanying symptoms (dizziness, subjective tinnitus). Initial hearing level and hearing outcome after 3 months was evaluated with pure tone audiometry.

Results:Among the 133 sudden sensorineural hearing loss patients, 20 patients underwent less than 4 times of ITDI (mean: 2.6 ± 0.7 times) and 113 patients underwent more than 4 times (mean: 4.4 ± 1.3 times). There was no difference in the duration from the onset of hearing loss to initial injection between groups ($p=0.56$). In the mild to severe hearing loss subgroup (20-80 dB), there was also no significant difference in audiologic outcome between groups. In profound hearing loss group (80dB or more, $n=54$), however, the mean hearing thresholds after 3 months were 80.9 ± 24.1 dB in group 1 ($n=7$) and 55.4 ± 42.2 dB in group 2 ($n=47$). Group 2 showed significant audiologic improvement than group 1 ($p=0.038$).

Conclusions:The number of ITDI in patients with sudden hearing loss should be considered individually according to the Initial hearing level. In particular, patients with profound hearing loss can benefit from multiple ITDIs.

» **OTPP-14 16:20~16:30**

» The follow up result of infants who referred unilaterally on the new born hearing screening test

*Department of Otolaryngology Head and Neck surgery,
Inje University Haeundae Paik Hospital*

Myung Jun LEE, Jae-Mahn CHO, Moo Jin BAEK

Objectives:Children with unilateral hearing loss cannot express their symptoms but also even their parents cannot easily notice whether they have unilateral hearing loss or not. This is the reason why screening tests for hearing loss have to be done as soon as possible. However, Until now there has been insufficient study about the prognosis on infants who were referred on the newborn hearing screening test unilaterally. Our objective of the study is to analyze the prognosis of those who were referred by short term follow-up.

Methods:From July 2010 to December 2017 at Haeundae Paik hospital, a total of 2541 newborns received newborn hearing screening with automated auditory brainstem response(AABR). Newborns who were referred had follow-up auditory brainstem response(ABR) tests after 3,6,9,12 months and was confirmed at the 12th month.

Results:118 of the 2541 newborns were referred and among them 55(2.1%) newborns had bilateral hearing loss and 63(2.47%) newborns appeared to have unilateral hearing loss. After 12months, five(0.19%) patients were confirmed to have bilateral hearing loss and 3(0.11%) patients were confirmed to have unilateral hearing loss.

Conclusions:Only 6% of the infants who were referred after the newborn hearing screening test were confirmed to have unilateral hearing loss whereas the majority showed recovery. Even though referred at the newborn hearing screening test we should do a regular follow-up and wait for recovery for an adequate short period rather than immediate diagnosis and intervention.

» **OTPP-15 16:30~16:40**

» Hazardous alcohol consumption and risk of hearing impairment in Korean adults based on the 2012 KNHANES

*Department of Otorhinolaryngology, Jeju National
University College of Medicine
Jin-A PARK, Michelle JSUH*

Objectives: We investigated the relationship between hearing impairment and alcohol-drinking pattern in adult.

Methods: The data from 2012 Korean National Health and Nutrition Survey (KNHANES) was used with subjects of 3860 adults who are 20 years old or over without history of malignancy or chronic otitis media. The pure-tone average (PTA) of hearing thresholds at 500,1000,2000,3000 Hz frequencies was calculated. Hearing loss was defined as a PTA $\geq$ 40 dB in one or both ears. AUDIT (Alcohol Use Disorder Identification Test) was used to evaluate drinking status of subjects. Data were analyzed by complex sample χ^2 -test of independence and complex sample logistic regression analysis.

Results: In study population, 8.1% in males and 7% in females had hearing impairment. The degree of drinking categorized by AUDIT showed 58.2% of appropriate, 32.1% of risk, 9.7% of hazardous drinking in male, 76.4 %, 12.5%, and 11.1% in female, respectively. In male adults, hierarchical multiple logistic regression analysis revealed that the odds ratio of hearing loss is increased by 2.518 times with comparing hazardous to appropriate drinking (CI 1.097,5.778, $p=0.002$) after adjusting for factors associated with hearing loss. Moderate alcohol consumption, which is defined as having up to 1 drink/day for women and up to 2 drink/day for men has not been shown to be protective on hearing in either group.

Conclusions: As hazardous drinking tends to coexist with hearing impairment in male adults, appropriate hazardous drinking prevention and intervention strategies should be emphasized.

OTPP IV

RM 1-2 (Exhibition Hall B)

Chair : Kyung Wook HEO

Auditory Nerve System & Audiology

» **OTPP-16 15:50~16:00**

» PCM1 polymorphism is associated with sudden deafness in Korean population

¹Department of Otolaryngology, School of Medicine, Keimyung university, Daegu, Korea, ²Department of Preventive Medicine, School of Medicine, Keimyung University, Daegu, Korea

Ji Ryong KIM, Jun Wan PARK, Dong Hoon SHIN², Sung Il NAM¹

Objectives: The formation of organized microtubule arrays depends on satellite proteins, such as pericentriolar material 1 (PCM1). The A disorder caused by inner hair cell is known to be associated with sudden sensorineural hearing loss (SSNHL). The present study aimed to investigate whether PCM1 polymorphisms are associated with SSNHL.

Methods: Medical records of 83 SSNHL patients were reviewed to assess hearing recovery rate and examine factors associated with prognosis, polymorphisms of PCM1 gene, and compare them with 371 controls. Single nucleotide polymorphism (SNP) of PCM1 (rs7814692, rs412750 and rs208753) was analyzed using the direct sequencing.

Results: The minor allele was found to be related to an decreased risk of SSNHL compared with the major allele in 3 SNPs, respectively ($p = 0.0037$, $p = 0.0048$ and $p = 0.0004$). Hearing recovery in SSNHL was associated with tinnitus presence ($p = 0.014$), before 7 days in time of onset ($p = 0.012$) and higher frequencies AG/AA genotype of rs412750 ($p = 0.049$).

Conclusions: These results suggest that the PCM1 polymorphism is associated with an decreased risk of

SSNHL. Furthermore, the AG/GG genotype of rs412750 may be a positively factor in hearing loss recovery for SSNHL.

» **OTPP-17 16:00~16:10**

» Analysis of auditory brainstem response wave forms in tinnitus patient with normal hearing according to tinnitus duration

*Department of Otorhinolaryngology-Head and Neck
Surgery Korea University College of Medicine*

**Jae Woo JOO, Jihye RHEE, Yoon Chan RHA,
Mun Soo HAN, Yong Jun JEONG, Kang Hyeon
LIM, Kuk Jin NAM, In Sik SONG, June CHOI**

Objectives: Although Auditory Brainstem Response (ABR) of hearing impaired patients have already been analyzed through several studies, the evaluation of ABR for tinnitus is relatively unknown. The aim of this study was to investigate the ABR of tinnitus patients according to duration of the disease.

Methods: From Jan 2017 to Dec 2017, patients with tinnitus were enrolled in the study. Pure tone audiometry (PTA) and ABR were conducted for the participants. The participants were classified into 3 subgroups according to duration of the tinnitus. The amplitude and latency of the ABR were collected and analyzed for each group and compared.

Results: Total of 63 patients (26 males, 37 females) were included. The average age was 43.68 ± 16.6 years old. In patients with symptom less than 1 month, the amplitude of the wave I was $0.19 \pm 0.53 \mu V$ and the amplitude of the wave V was $0.424 \pm 0.100 \mu V$. The interaural latency difference (IAD) of I-III, I-V, III-V were 1.89 ± 1.07 ms, 3.45 ± 1.94 ms, 1.56 ± 0.90 ms respectively. In the case of the patients whose symptom was more than 1 month and less than 6 months, the amplitude of the wave I was $0.27 \pm 0.14 \mu V$ and the amplitude of the wave V was $0.38 \pm 0.13 \mu V$. The IAD of I-III, I-V, III-V were 2.27 ± 0.20 ms, 4.13 ± 0.29 ms, 1.85 ± 0.19 ms respectively. The amplitude of wave I in patients with tinnitus over 6 months was $0.24 \pm$

$0.17 \mu V$ and wave V was $0.41 \pm 0.15 \mu V$. The IAD of I- III, I-V, III-V were 2.20 ± 0.58 ms, 4.18 ± 0.58 ms, 1.98 ± 0.87 ms.

Conclusions: There was no significant difference of the amplitude and IAD between the groups which was classified according to the duration of disease. Further study including large number of participants should be conducted in the future.

» **OTPP-18 16:10~16:20**

» A non-linear curve fit analysis for the mean and median hearing thresholds in normal population of KNHANES 2010-2012

*Department of Otorhinolaryngology-Head and
Neck Surgery, College of Medicine, Ewha Womans
University*

**Mi Sun CHUN, Sung Wan BYUN, Seung-Ho
SHIN, Yun Hwi PARK, Ju Yeon KIM, So Jeong
LEE**

Objectives: There have been several reports on normal hearing thresholds based on the Korea National Health and Nutrition Examination Survey (KNHANES) 2010– 2012. In a medicolegal work for the elderly, the apportionment of age- and gender-related hearing loss should be considered as an important factor. It is well known that hearing thresholds increase in an accelerating (non-linear) manner as ages increase. Smooth curve fits for 'mean' hearing thresholds according to age were reported in previous studies. Since the hearing thresholds show positively skew normal distributions, there could be some discrepancies between 'median' and 'mean' hearing thresholds. In this study, smooth curve fits for 'median' thresholds are investigated and compared with those for 'mean'.

Methods: With the R statistical software, non-linear curve fit analyses were conducted for the hearing thresholds data for KNHANES (15,606 participants representing 33,011,778 Koreans). Respecting the complex survey design of KNHANES, all values were treated

considering their weights. Three simple accelerating (non-linear) mathematical functions are prepared and iterated : polynomial ($y=k+ax+bx^2$), power ($y=a+b*x^k$), and exponential ($y=k+\exp(a+bx)$). Each Best fit was determined by the least RSS(Residual Sum of Squares) and RSE(Residual Standard Errors).

Results: All data and mathematical functions could be fitted successfully (statistically significant). For the 'mean' thresholds, the polynomial function usually showed a best fit. However, the power function usually achieved best for the 'median'. For each gender, the exponent of the power function for 'median' was greater than that for 'mean'.

Conclusions: The best non-linear curve fits for the 'median' hearing thresholds for normal population would have somewhat different characteristics from that for 'mean' thresholds.

» **OTPP-19 16:20~16:30**

» Effect of type of steroid administration on recovery of sudden hearing loss

Department of Otorhinolaryngology, Ewha Womans University, College of Medicine

**Yun Hwi PARK, Seung-Ho SHIN,
Sung Wan BYUN**

Objectives: This study aimed to verify whether types of steroid administration affect on recovery of sudden hearing loss.

Methods: This retrospective study at a tertiary referral center included 33 patients who were treated by 10-day course of oral steroid therapy or intratympanic dexamethasone therapy. They were divided into three groups. Group 1 consisted of 9 patients who received only intratympanic dexamethasone therapy. Group 2 were 17 patients who received intratympanic dexamethasone and oral steroid ingestion which was conducted in daily once manner in the morning. Group 3 was comprised of 7 patients who received intratympanic dexamethasone and daily twice oral steroid ingestion.

Results: Of 33 patients who recovered over three months of follow-up, 54.5 % showed complete recovery of 10-day course of therapy. Recovery of hearing among three groups did not show any difference in terms of Siegel's criteria and degree of hearing improvement.

Conclusions: In our study, types of steroid administration did not affect on recovery of sudden hearing loss, although this result should be further studied by additional research.

» **OTPP-20 16:30-16:40**

» Acute auditory nerve stimulator (NerveOn-Ex)

¹Department of Otorhinolaryngology-Head & Neck Surgery, College of Medicine, Seoul National University Hospital, ²Interdisciplinary Program in Neuroscience, College of Natural Sciences, Seoul National University, ³TODOC Co Ltd

**Doo-Hee KIM^{1,2,3}, Woo-Jin AHN³, Seung-Hoon LEE³, Jin-Won KIM³, Se-Ri LEE³, Ho-Seung LEE³, Kyou-Sik MIN³, Ji-Yeon Bae¹,
Seung-Ha OH^{1,2,3}**

Objectives: Performance evaluation of developed nerve stimulator for the auditory system

Methods: The stimulator consists of an electrode-head-mount module and external stimulator module. The electrode-head-mount module includes four channel stimulation electrodes, one reference electrode and head-mount cable for a rat was developed. Headmount is fixed on the vertex of the head of the animal for delivering electrical stimulation from the external stimulator. Stimulation electrodes were placed on the promontory in the inner ear. The external stimulator was synchronized with SmartEP. Parameters such as rate, width, and amplitude of pulses were modulated to observed electrically evoked auditory brainstem response (EABR).

Results: Stimulation electrodes were placed and fixed properly on the promontory while acute experiment. The stimulator was synchronized with the EABR measure equipment via delivering TTL trigger pulse for each

stimulation pulse. EABR was observed and the threshold was found.

Conclusions: Acute auditory nerve stimulator was developed and evaluated its efficacy successfully.

OTPP V

RM 1-2 (Exhibition Hall B)

Chair : **Chang Hoon BAE**

Auditory Rehabilitation

» OTTP-21 15:50~16:00

» Comparison of high and low price hearing aid (functional and questionnaire outcomes)

*Department of Otorhinolaryngology, Dankook
University Hospital*

**Hyun Ju LEE, Ji-Eun CHOI, Jae Yun JUNG, Min
Young LEE**

Objectives: Hearing aids has been a useful tool for hearing loss patients. However, considering the growing population of hearing loss patients and senile changing of modern society, its appliance has been quite low possibly due to the stigma and high price of hearing aid. The functional and post purchase satisfaction comparison of high price hearing aid compared and low price one would help the better understanding of future hearing aid user but it not much studies were reported. In the current study, we assessed whether price of hearing aid affects the functional outcome and questionnaire scores.

Methods: Hearing aid users who purchased and fitted hearing aid in our department between Jan to Dec 2017 were enrolled (N=112). These hearing aid uses were divided in groups by there hearing aid price; high price hearing aid (HPHA) and low price hearing aid (LPHA). Word recognition scores (WRS) with hearing aids and K-IOI-HA (questionnaire) was compared. In addition, correlations

of hearing aid price to WRS and K-IOI-HA score were evaluated.

Results: There was no difference of WRS with hearing aid between HPHA and LPHA group. But as for the gain of WRS after hearing aid (WRS aided – WRS unaided), HPHA group showed statistically larger value compared to the LPHA group ($p = 0.026$). In the questionnaire analysis, the average of total K-IOI-HA score was statistically higher in HPHA group compared to LPHA group ($p = 0.032$), and subcategories that shows significantly better outcome of HPHA were Satisfaction, RPL and RAL. The price of hearing aid significantly correlated to WRS and total K-IOI-HA score (R value each: 0.253 and 0.329).

Conclusions: The price of hearing aid seriously affected the WRS gain and K-IOI-HA scores. However further prospective analysis blinding the price of hearing aid is necessary to reduce the placebo effect of hearing aid price.

» OTTP-22 16:00~16:10

» Outcome of vibrant soundbridge implantation in young adults with sensorineural hearing loss

*Department of Otorhinolaryngology-Head and Neck
Surgery, The Catholic University of Korea*

**Su-Bin KIM, Ki-Hong CHANG, Byung-Guk KIM,
Jeong-Hoon OH**

Objectives: The aim of this study was to assess the surgical and audiological outcome of the middle ear implant Vibrant Soundbridge (VSB) in the patients younger than 40 years old with moderate sensorineural hearing.

Methods: A retrospective, case-series study ($n=3$) was performed. The mean age at implantation was 32 years (min. = 19, max. = 39). Audiological outcome and speech intelligibility were assessed before and after the Incus short process vibroplasty.

Results: Bone conduction (BC) thresholds were preserved after the implantation and a functional gain of 20-30 dB was achieved in all frequencies including 250 and 500 Hz. All patients reported better sound quality and more natural

voice perception.

Conclusions: The authors report that the residual hearing of the young patients with sensorineural hearing loss can be preserved with incus short process vibroplasty with remarkable functional gain.

» **OTPP-23 16:10~16:20**

» Does objective audiometry can predict subjective satisfaction in patients with hearing aid

*Departments of Otorhinolaryngology, Asan Medical
Center, University of Ulsan College of Medicine*

**Woo Ri CHOI, Jun Woo PARK, Jung Ho AHN,
Hong Ju PARK, Jong Woo CHUNG,
Woo Seok KANG**

Objectives: This study was aimed to find out which objective audiometry of the hearing aid can be used to maximize subjective satisfaction in patients with hearing aid.

Methods: 12 patients with moderate hearing loss and 8 patients with moderately-severe hearing loss were included. We performed K-HHIE (Korean version of Hearing Handicap Inventory for the Elderly) and K-IOI-HA (Korean version of International Outcome Inventory for Hearing Aids) before and one month after wearing a hearing aid. We also performed pure tone audiometry (PTA), speech audiometry (SA), functional gain (FG), real ear measurement (REM), and hearing in noise test (HINT). Patients were divided into two groups (A-HHIE : improved, B-HHIE : same or worse) by score of K-HHIE. In the K-IOI-HA questionnaire, they were measured after wearing a hearing aid and 21 points were known as the average score. Based on this, we divided them into two groups (A-IOI : 21 or higher, B-IOI : lower than 21). The differences of objective tests were analyzed.

Results: Group A-HHIE included 10 patients and group B-HHIE included 10 patients. In PTA, unaided and aided hearing thresholds were better in group A-HHIE, but there was no statistical significance. The results of SA,

REM, and HINT did not differ between groups A-HHIE and B-HHIE. Group A-IOI included 12 patients and group B-IOI included 8 patients. There was no statistically significant difference in age, PTA, REM, and HINT between two groups. In SA, higher improvement of speech discrimination was found in group A-IOI, but the significance was not confirmed.

Conclusions: There was no statistically significant and consistent indicator in objective audiometry to reflect patients' satisfaction of hearing aid. But patients who have better initial residual hearing shows better improvement of K-HHIE that reflects psychological and social satisfaction of hearing aid. And the patient who has higher improvement of speech discrimination shows higher K-IOI-HA score that reflects functional satisfaction of hearing aid.

» **OTPP-24 16:20~17:30**

» Hearing aids fitting using speech mapping in pediatric patients soree ear clinics experiences

Soree Ear Clinic, Seoul, Korea

**Hye Jin LIM, You-Ree SHIN, Seong-Cheon BAE,
Kyoung-Ray MOON, Kwang Sun LEE, Chong-
Sun KIM, Young-Myoung CHUN**

Objectives: Fitting hearing aids(HAs) are not easily got in children. Therefore, we tried HAs fitting based on real ear measurement in all pediatric cases. We would like to share our experiences with the review of cases.

Methods: We retrospectively reviewed the chart, hearing test results (unaided/aided pure tone audiometry, auditory brainstem response (ABR), auditory steady state response(ASSR)) and speech mapping(SM) results of representative three cases.

Results: Case1: Pediatric HA fitting process in Soree Ear Clinics Seven months male patient with 80nHL hearing threshold in ABR was successfully fit with HAs using SM based on ABR and BA serially. Parents counseling was done using output result graph in SM and aided gain in sound field. Case2: Insufficient amplification with manufacturer's

fitting program We performed SM in 4-year old male patient who had worn HAs since 3 months. We considered this patient got the best fitting based on manufacturer's fitting program, but the SM result showed insufficient aided gain. After fitting based on SM, the aided gain and speech evaluation result were improved. Case3: Over-amplification due to fitting based on ABR and ASSR One year 6 months old patient with no response at 90nHL in ABR result tried HAs before surgery, refused to wearing HAs. We considered the possibilities of discomfort of HA, over-gain or insufficient gain. We had done auditory training and got the residual hearing throughout the frequencies, and fit the HAs based on the behavioral audiometry result using speech mapping. The two aided gains based on ABR and BA were compared.

Conclusions: In our experience, SM is more accurate and reliable method than traditional fitting process and can be performed in most of pediatric patients. However, acquiring of the behavioral audiometry result with auditory training is necessary for the better fitting outcome. SM is also helpful to explain and educate the parents about how much the gain is reached to target gain in their children's real ear objectively.

» **OTPP-25 16:30~16:40**

» Assessment of hearing handicap in patients with unilateral sudden sensorineural hearing loss

*Department of Otorhinolaryngology, Gangnam
Severance Hospital, Yonsei University College of
Medicine*

**In On KIM, Ji Hyung KIM, Min Pyo HONG, Seong
Ah HONG, Yu Ji LEE, Gi Sung NAM,
Eun Jin SON**

Objectives: Sudden sensorineural hearing loss (SSNHL) usually affects one ear, and patients experience difficulties in situation that require binaural hearing such as in a noisy room. In this study, we aimed to investigate the perception of hearing handicap in patients with SSNHL.

Methods: A retrospective review of 138 patients (mean age 49 ± 17 , M:F=11:12) diagnosed with SSNHL between 2016 and 2017 were performed. Hearing handicap due to sudden unilateral hearing loss was assessed using the Hearing Handicap Inventory for Adults (HHIA) in 31 patients (mean age 49 ± 16 , M:F=13:18). Correlation of hearing handicap and their audiometric data and clinical characteristics were analyzed.

Results: Demographic or audiological characteristics were comparable between patient who completed HHIA and those who did not. Twenty patients (64.51%) reported no hearing handicap, and hearing handicap was mild to moderate in 7 patients (22.58%) and significant in 4 patients (12.9%). Mean total score was 17.55 ± 22.18 , and mean emotional and social-situational scores were 24.62 ± 12.37 and 18.67 ± 11.06 , respectively. Statistical analysis showed weak correlation between the degree of hearing loss in the affected ear and hearing handicap. However, no significant correlation was shown with age, sex, contralateral hearing level or presence of tinnitus.

Conclusions: A portion of patients with sudden onset of unilateral hearing loss reported some degree of hearing handicap. Addition of HHIA as an adjunctive measure may be valuable during treatment and rehabilitation process for SSNHL.

OTPP VI

RM 1-2 (Exhibition Hall B)
Chair : **Min-Hyun PARK**

Vestibular Disorder & Others

» **OTPP-26 15:50~16:00**

» Dizziness & fall risk assessment and intervention in acute vestibular neuritis

*¹Department of Otolaryngology-Head and Neck
Surgery, College of Medicine Korea University, Seoul,*

Korea, ²Department of Otorhinolaryngology-Head and Neck Surgery, College of Medicine Hallym University, Dongtan Sacred Heart Hospital, Hwaseong, Korea
EuyHyun PARK¹, Sung Kyun KIM², Jinnyeong JANG¹, June CHOI¹, Yoon Chan RAH¹, Jae Jun SONG¹, Sung Won CHAE¹, Hak Hyun JUNG¹, Gi Jung IM^{1*}

Objectives: This study was to assess the risk of dizziness & fall, and to evaluate the pattern of recovery after vestibular rehabilitation in acute vestibular neuritis (AVN) patients in the Tertiary Hospital. This study also evaluate the efficacy of vestibular rehabilitation to improve the vestibular function in AVN.

Methods: In the study of AVN, 41 patients were diagnosed from the symptoms of acute onset and sustained vertigo. Vestibular functions of the patients were evaluated by the protocols including SOT, rotatory test, caloric test, VEMP, PTA, and ECoG. The survey of dizziness and fall risk consists of VAS, previous fall & dizziness history, Morse fall scale, DHI, and SAFTE. Patients were given three types of physical tests: 30 sec chair stand test, 4 stage balance test, and the timed up and go test.

Results: Vestibular function was evaluated at the time of both initial attack and 3 months after the vertigo attack in the patients of AVN. In the result of SOT using Posturography, initial composite score was 63 ± 13.1 , and improved to 77.5 ± 4.9 after 3 months from the vertigo attack ($p < 0.001^{***}$). Initial composite score was 63 ± 13.1 , and improved to 77.5 ± 4.9 after 3 months from the vertigo attack ($p < 0.001^{***}$). Using bithermal caloric test, both CP and DP were estimated in the patients of AVN. Mean score of Initial CP was 42.9 ± 35.2 , and improved to 29.9 ± 23.5 after 3 months from the vertigo attack ($p < 0.01^{**}$). Both initial and 3 month time, VEMP score between pathologic side and normal side was not significantly different ($p > 0.05$). In AVN, VAS-DHI-FOF were significantly improved from initial attack time of AVN to 3 months after the attack.

Conclusions: In AVN, subjective improvement of dizziness degree was confirmed using VAS-DHI-FOF. Objective

vestibular function using SOT and caloric test was significantly improved after 3 months from the vertigo attack. Appropriate dizziness & fall risk assessment and intervention is effective to control AVN and recover vestibular function in dizzy patients.

» **OTPP-27 16:00~16:10**

» Analysis of frequency-specific cervical vestibular evoked myogenic potential threshold and other factors in normal persons

Department of Otorhinolaryngology-Head and Neck Surgery, College of Medicine, Dankook University
Min Tae KIM, Ki Yong CHOI¹, Ji Eun CHOI¹, Min Young LEE¹, Jae Yun JUNG¹

Objectives: Cervical Vestibular Evoked Myogenic Potential(cVEMP) is a clinical test to evaluate saccular and inferior vestibular nerve function. It is known to be clinically helpful in diseases such as Meniere's disease. However, it is still unclear how to distinguish between normal and dizziness patients with cVEMP. So, it is the purpose of measuring and analyzing cVEMP measurement results in normal hearing subjects. In addition, it will be helpful to diagnose dizziness patients by using cVEMP in comparison with VEMP results in future.

Methods: A prospective study of 13 normal hearing adults(26 ears) without other medical problems was performed. cVEMP were measured using tone burst at 500Hz and 1000Hz. Threshold measurements were started from 95dB nHL and lowered 5dB nHL units. Amplitude and latency were measured at P23 and N23. Also interpeak difference between P23 and N23 was measured.

Results: Average threshold of 1000kHz(92.61dB) was higher than that of 500kHz(86.73dB). Among 26 ears, 24 ears have higher threshold at 1000kHz, only two cases shows equal threshold results. To investigate the relationship between magnitude of threshold and amplitude, amplitude ratio of 500Hz to 1000Hz was measured. Ratio values tend to be bigger in the cases that threshold difference was

more than 10dB. Latency of P13 and N23 at 1000Hz was shorter than that of 500Hz. And interlatency was also shorter at 1000Hz.

Conclusions: In normal persons, threshold of 1000Hz is higher than that of 500Hz., and latency of 1000Hz was shorter in P13, N23, and interlatency between P13 and N23. The larger the threshold difference in one ear, the greater the amplitude value. It is necessary to increase the number of subjects in order to reinforce the validity of the results.

» **OTPP-28 16:10~16:20**

» Gait study on peripheral vestibular disorder by motion-core analysis

Department of Otolaryngology-Head and Neck Surgery, Kosin University College of Medicine, Busan, Korea

Yeong Wook JEONG, Hwan Ho LEE

Objectives: Despite patients with dizziness were reported of revealing gait problems, there is still lack of objective quantitative measurement of gait patterns of peripheral vestibular disorder. Based on a shoe-type wearable device, this paper develops gait analyzing algorithms to obtain quantitative measurements and explores the essential indicators from the measurements for peripheral vestibular disorder diagnosis.

Methods: Between April 2017 and January 2018, 101 patients diagnosed with peripheral vestibular disorder (Dizziness(N=10), Vestibular neuritis(N=30), Meniere's disease(N=29), Sudden sensory neural hearing loss with vertigo(N=20), BPPV(N=12) were enrolled in this study. The DynaStab™ (Inertial measurement unit based (IMU) gait analysis system) including Smart Balance® (shoe-type data logger) was used to analysis subjects. We assessed the directional Stride regularity (SR) and Gait variability (GV) of data from shoe-type IMU sensors during leveled treadmill walking. Patients were checked with physio-fit-score, energy-consume-score and dynamic-

bodybalancing-score for gating pattern. We tested 1,217 healthy volunteers and classified them as top healthy, near healthy and lowest healthy groups.

Results: We identified time of toe off among the parameters of the human walking pattern. The time to toe off rate of patients with peripheral dizziness was increased to 61.42 compared to 60 in healthy volunteer. The pattern of walking patterns of peripheral dizziness patients was similar to those of the lowest healthy group.

Conclusions: The shoe-type IMU sensor system assessed directional SR and GV during walking in peripheral vestibular disorder patients conveniently. The time to toe off rate of patients with peripheral dizziness was increased.

» **OTPP-29 16:20~16:30**

» Clinical implication of intralesional steroid injection with special regard to age of otohematoma and long-term follow-up

Department of Otorhinolaryngology-Head and Neck Surgery, Seoul National University Boramae Medical Center, Seoul National University College of Medicine, Seoul, South Korea

Sang-Yeon LEE, Sun A HAN, Young Ho KIM

Objectives: To evaluate the long-term treatment effectiveness of intralesional steroid injections (ILSI) in subjects with otohematoma and to suggest clinical implication with special regard to age of otohematoma in the management of otohematoma.

Methods: 56 eligible subjects were enrolled and classified into the short-standing otohematoma (n=30) and long-standing otohematoma (n=26) based on 2 weeks of from the day of auricular trauma. After the first ILSI, all subjects were scheduled for the weekly examination during the observational period of 21 days to determine the treatment outcomes then, followed as our protocol up to 36 months. We considered ILSI to be no effective if otohematoma persisted after 3rd ILSI and opted to perform surgical treatment. In addition, we evaluated early recurrence, late

recurrence, and complications.

Results: 29 out of 30 cases (96.7%) with short-standing otohematoma and 20 out of 26 cases (76.9%) with long-standing otohematoma were treated with ILSI during observational period. In evaluation period, no complications were reported, but only three subjects with long-standing otohematoma experienced the late recurrences at 4, 15, and 18 months, respectively. In this study, 7 subjects underwent surgical treatment; the initial aspirated fluid volumes of the non-responders tended to be higher than those of ILSI responders (1.34 ± 0.57 vs 0.89 ± 0.29 mL, $p = 0.083$). Notably, non-responders with long-standing otohematoma showed pathologic changes of perichondrium such as fibrocartilage formation, myxoid degeneration, and granulation tissue.

Conclusions: ILSI may play critical role in the fundamental management of otohematoma. We also demonstrated the longitudinal therapeutic efficacy of ILSI. However, considering that limitations including late recurrences over 1 year and the necessity of surgical treatment in some cases, long-term follow-up is mandatory, additionally, appropriate treatment approach may be based on the otohematoma age and size.

» **OTPP-30 16:30~16:40**

» **Correlation of frequency-specific auditory brainstem response test and pure tone audiometry test**

*Department of Otorhinolaryngology-Head and Neck Surgery, Inje University College of Medicine,
Haeundae Paik Hospital*

Dong-Woo KIM¹, Myung-Jun LEE², Moo-Jin BAEK²

Objectives: Hearing loss is diagnosed by Pure Tone Audiometry (PTA) test and Auditory Brainstem Response (ABR). Purpose of this study is to find a correlation between the thresholds of PTA with individual frequency and average of combined frequencies among 0.5 kHz, 1

kHz, 2 kHz, 3 kHz, 4 kHz and ABR thresholds in the high frequency-hearing loss patients, and to investigate the effect of 0.5 kHz of PTA on the correlation with the threshold of ABR.

Methods: We investigated the association of PTA with hearing thresholds of individual frequencies of 0.5 kHz, 1 kHz, 2 kHz, 3 kHz, and 4 kHz and ABR thresholds. We compared the hearing thresholds of various frequencies between 0.5 and 4 kHz. The threshold value was calculated and the relationship with the ABR threshold was analyzed. We also compared the relationship between ABR threshold and the inclusion and exclusion of 0.5 kHz PTA. Statistical analysis was performed using the SPSS Statistics (version 23) program. The Pearson correlation analysis was performed on the PTA frequency threshold, the PTA mean threshold and the ABR threshold. The threshold value including 0.5 kHz and the threshold value of 0.5 kHz and the correlation with the ABR threshold was also analyzed.

Results: Investigated the association of PTA with hearing thresholds of individual frequency of PTA threshold at the 0.5 kHz, 1 kHz, 2 kHz, 3 kHz, 4 kHz and average of combined frequencies of PTA thresholds at the 1+2+3 kHz, 1+2+3+4 kHz showed strong positive(+) correlation with the ABR threshold ($r = 0.628 \sim 0.780$), $p < 0.001$). In the case of including 0.5 kHz threshold, a strong positive(+) correlation ($r = 0.713 \sim 0.800$, $p < 0.001$) was still shown. Among the thresholds of various PTA frequencies, thresholds at the 0.5+3 kHz averaged frequency ($r = 0.800$, $p < 0.001$) and 0.5+1+2+3 kHz averaged frequency ($r = 0.800$, $p < 0.001$) were highly correlated with the ABR threshold.

Conclusions: It is useful to use the appropriate PTA frequency combination including 0.5 kHz to identify the high correlation between PTA threshold and ABR threshold in high - frequency hearing loss patients

» **OTPP-31 16:40-16:50**

» **Evaluation of the software-based Korean matrix sentence in noise**

Department of Audiology, Hallym University of

Graduate Studies, Seoul, Korea
Kyung Hyun KIM, Jae Hee LEE

Objectives:To assess realistic problem in daily communication for the hearing-impaired listeners, a speech-in-noise test is of crucial importance for auditory diagnostics and rehabilitation. Considering that a sentence-in-noise test better simulates the process of natural communication in which the target sentence is usually masked by some noise, the sentence-in-noise test materials with fixed grammatical structure (called Matrix sentence in noise test) have been developed in various languages. To develop the software-based Korean Matrix Test material, this study conducted the evaluation of test lists.

Methods:1. Selection of final word realizations and word-specific level adjustment for the software-based test 2. Test-retest reliability 3. Derivation of list-specific intelligibility

Results:Results of evaluation will be discussed in presentation.

Conclusions:The software-based Korean Matrix Test material can be used as a clinical test material.

RHPP I

RM 1-2 (Exhibition Hall B)

Chair : Hyun Jun KIM

Rhinosinusitis

» **RHPP-01 15:50~16:00**

» Comparison of clinical characteristics of fungal ball with chronic rhinosinusitis

*Department of Otorhinolaryngology, School of
Medicine, Catholic University of Daegu*

Youn-Tae SEO, Gyu-Ho JANG, Bo-Mun KIM, Mi-Kyung YE, Seung-Heon SHIN

Objectives:Fungal ball (FB) is the most common fungal rhinosinusitis and has been reported increasingly in immunocompetent patients. Although various studies have been reported, the clinical characteristics of fungal ball was not commonly studied. The aim of this study was to compare the clinical characteristics of fungal ball patients with chronic rhinosinusitis patients with or without nasal polyp (CRSwNP or CRSsNP).

Methods:We retrospectively analyzed 95 FB patients who underwent endoscopic sinus surgery at 2007 (n=16), 2011 (n=28), and 2016 (n=51). We checked the change of prevalence rate of FB and clinical findings, such as chief complain pre- operative CT findings, allergic status, olfactory function, concomitant systemic diseases, etc, by analyzing the medical records.

Results:The incidence of fungal ball significantly increased with respect to time (2007; 6.9%, 2011; 11.2%, 2016; 18.1%). Headache was the most common chief complain of FB (32.1%) and nasal obstruction was most common in CRSwNP (78.6%) and CRSsNP (46.5%). Lund-Mackay score was significantly different among three groups (FB: 3.7, CRSwNP; 7.0, and CRSsNP; 5.2) and anosmic patients were most common in CRSwNP (43.4% vs FB; 10.7%, CRSsNP; 23.3%). CRSwNP commonly

accompanied allergy and systemic diseases, such as hypertension, diabetes mellitus. Surgical results was best in FB.

Conclusions: We found that the prevalence of fungal ball has increased steadily and clinical characteristics are significantly different from CRSwNP and CRSsNP.

» **RHPP-02 16:00~16:10**

» **Role of IL-10-expressing B cells on the pathophysiology of chronic sinusitis**

¹Department of Otorhinolaryngology-Head and Neck Surgery, Research Institute for Medical Science, Chungnam National University School of Medicine, Daejeon, Korea

Hee Sung PARK¹, Soo Kyoung PARK¹, Sun Hee YEON¹, Jun XU^{1,2}, Ki Sang RHA¹, Yong Min KIM¹

Objectives: Many kinds of inflammatory cells and cytokines are suggested to be related with pathophysiology of chronic rhinosinusitis with nasal polyp (CRSwNP), but not yet fully understood. In particular, little is known about the function and role of IL-10 producing regulatory B cells. The aim of this study was to investigate the presence and function of B cells, especially IL-10-producing regulatory B cells, in the nasal polyp and nasal mucosa in each group.

Methods: 20 patients with CRSwNP, 10 patients with chronic rhinosinusitis without nasal polyp (CRSsNP) and 10 control subjects were enrolled in this study. NP tissues and uncinate tissues (UT) were collected for analysis. Real-time PCR, immunohistochemistry were performed to measure the expression levels of the selected inflammatory cytokines and inflammation-associated molecules.

Results: In the mucosal tissues of CRSsNP patients, the number of IL-10 + B cells was significantly lower than that of nasal polyp and control mucosa of CRSwNP patients. The numbers of IL-10 + B cells were significantly increased in the eosinophilic nasal polyp, non-eosinophilic nasal polyp, CRSsNP, and control groups. There was a significant positive correlation between the number of IL-10 + B cells

and B-cell activating factor (BAFF).

Conclusions: The expression of IL-10 + B cells and BAFF was significantly increased in CRSwNP patients compared to CRSsNP patients and control mucosal tissues, and IL-10 + B cells were more significantly increased in eosinophilic tissues. These results indicate that regulatory B cells are involved in the pathophysiology of eosinophilic nasal polyp and that BAFF contributes to the production of regulatory B cells.

» **RHPP-03 16:10~16:20**

» **Treatment strategy of odontogenic sinusitis**

Department of Otolaryngology-Head & Neck Surgery, Hanyang University College of Medicine
Byung Joon YOO, Woo Sung PARK, In Sik KIM, Seok Hyun CHO, Kyung Rae KIM, Jin Hyeok JEONG

Objectives: The treatment options of odontogenic sinusitis are medical treatment, endoscopic sinus surgery (ESS) and dental treatment. The aim of this study is to determine whether dental treatment alone is sufficient or whether patients will eventually require ESS for odontogenic sinusitis treatment.

Methods: A retrospective review performed of 30 patients with odontogenic sinusitis. Multiple factors including demographic factors, symptoms, endoscopic and CT findings, clinical course and management were analyzed. The patients lost during their follow-up or whose medical records omitted until the completion of treatment were excluded.

Results: Among total patients of thirty, sixteen patients cured with dental treatment alone and six patients required ESS after failure of dental treatment. Eight patients cured with immediate ESS alone without dental treatment. Among 22 patients who underwent dental treatment, 16 (73%) patients cured with only dental treatment. Patients who smoke ($p=0.013$) and patients with higher Lund-Mackay score on CT finding ($p=0.035$) required ESS after

failure of dental treatment with statistical significance.

Conclusions: Because odontogenic sinusitis is often improved by dental treatment alone, odontogenic sinusitis should be preceded by dental treatment and ESS should be performed after failure of dental treatment. However, if the CT findings show severe sinusitis, dental treatment alone will not improve the condition, so early ESS may be considered.

» **RHPP-04 16:20~16:30**

» The effect of α lipoic acid on cultured human nasal fibroblasts with urban particulate matter

¹Department of Otorhinolaryngology-Head and Neck Surgery, College of Medicine, The Catholic University of Korea, ²Clinical Research Institute, Daejeon St Marys Hospital

Dong Chang LEE¹, Hyunsu CHOI², Jeong-Min OH², Sung Won KIM¹, Soo Whan KIM¹, Jin Hee CHO¹, Joohyung LEE¹

Objectives: 오늘날 대기오염은 심각한 건강문제를 야기시키는 것으로 알려져 있으며, 미세먼지는 대기오염의 중요한 부분을 차지하고 있다. 이에 비강 유래 배양 섬유아세포에 미세먼지를 투여 후 활성산소(ROS, Reactive oxygen species)의 발현 여부를 확인하고, 항산화제인 α lipoic acid의 효과를 고찰하고자 한다.

Methods: 코막힘으로 하비갑개 부분 절제술을 시행한 환자 6명의 조직을 채취 후 세포 배양을 시행하였고, 섬유아세포임을 확인하였다. 배양된 섬유아세포에 미세먼지를 투여 후 농도에 따른 ROS의 발현량을 확인하고, α lipoic acid 투여 후 ROS의 발현량 차이를 비교하였다.

Results: 배양된 섬유아세포는 투여된 미세먼지 농도에 비례하여 ROS의 발현량이 증가하였다. 또한 α lipoic acid 투여시 ROS의 발현량이 감소하였다.

Conclusions: 미세먼지가 배양된 섬유아세포에 미치는 영향은 ROS에 의한 기전이 중요한 영향을 미치는 것으로 판단된다.

» **RHPP-05 16:30~16:40**

» Sphenoid sinus mucocoele after transsphenoidal pituitary surgery

Chonnam National University Medical School and
Hwasun Hospital

Sung Hoon KANG, Dong Hoon LEE, Jae Gu KIM, Sung Min JIN, Seung Bun KIM, Tae Mi YOON, Joon Kyoo LEE, Sang Chul LIM

Objectives: The purpose of this study was to review the clinical characteristics, treatment methods, and surgical outcomes of sphenoid sinus mucocoele after transsphenoidal pituitary surgery.

Methods: A total of 404 patients who underwent transsphenoidal pituitary surgery between January 2010 and December 2016 were identified. Among them, 5 patients with sphenoid sinus mucocoele were included in this study. In our hospital, a single-nostril endonasal endoscopic wide sphenoidotomy is routinely used for pituitary tumor surgery.

Results: The occurrence rate of sphenoid sinus mucocoele was 1.2 % (5 / 404). Of the 5 patients, 2 were males and 3 were females. Four lesions (80.0%) were located in the right sphenoid sinus and 1 lesion (20.0%) was located in the left sphenoid sinus. Endoscopic marsupialization for sphenoid sinus mucocoele was performed under local anesthesia in all patients. There were no major complications resulting from the surgical intervention, and there was no recurrence at the time of the last follow-up.

Conclusions: Sphenoid sinus mucocoele after endonasal transsphenoidal pituitary surgery is an extremely rare complication. Nasal endoscopy and MRI are useful for diagnosing this lesion. Endoscopic marsupialization is a safe and effective procedure for sphenoid sinus mucocoele after endonasal transsphenoidal pituitary surgery.

RHPP II

RM 1-2 (Exhibition Hall B)

Chair : Jae Hwan KWON

Others

» RHPP-06 15:50~16:00

» Comparison of cross-cultural smell identification test (CC-SIT) and Korean version of sniffin sticks test (KVSS) in normosmia

Department of Otorhinolaryngology-Head and Neck Surgery, College of Medicine, The Catholic University of Korea

Ji-sun KIM, Subin KIM, Byung Guk KIM

Objectives: This study compared the Identification test results of Korean Version of Sniffin 'Sticks Test (KVSS) and Cross-Cultural Smell Identification Test (CC-SIT) in normal olfactory group.

Methods: From September 2017 to January 2018, 19 healthy adults who took the olfactory test were included. The Visual Analog Scale (VAS) of these subjects was a perfect score, and at the same time subjects recognized 12 stages of Butanol Threshold Test (BT) on one side or both sides.

Results: The correlation between CC-SIT and KVSS identification test scores was 0.473 ($p = 0.041$) in this study. However, it was different from the correlation coefficient of previous study, 0.715, which analyzed the correlation between CC-SIT and KVSS identification test. The average correct answer rate for CC-SIT was 81.6 %, whereas that for KVSS was confirmed higher at 90.5 %. In the CC-SIT, the average correct answer rate of turpentine (item 2) was 47.4%, which was significantly lower than that of 84.4% excluding turpentine. On the other hand, the correct answer rate of turpentine, item 8 of KVSS, was 84.2%,

which was significantly different from the result of CC-SIT. Rose and banana, the items with the lowest correct answer rate next to turpentine, also exist in KVSS, where 18 out of 19 subjects answered correctly in both items.

Conclusions: It could be presumed that two identification tests had the same item, but that they had different answers because of different concentrations, molecular structures, or methods that released the olfactory material. In previous studies comparing different olfactory tests, objectivity was reduced by defining the subjects as normosmia when they felt that there was no problem in the olfaction, or when the olfactory identification test score was higher than the score specified by the researcher. This study confirmed that the same items can be perceived differently and that there are olfactory substances that are difficult for normosmia to recognize.

» RHPP-07 16:00~16:10

» Polysaccharide from *Hizikia fusiformis* enhances the immunomodulatory activity of macrophages

Department of Otorhinolaryngology-Head and Neck Surgery, College of Medicine, Chosun University
Yoon Sik PARK, Ji-Yun CHOI, Ji-Eun LEE

Objectives: In this study we investigated the anti-inflammatory and immune-modulatory effects and mechanisms of *Hizikia fusiformis* (H. *Fusiformis*) extracts in lipopolysaccharide (LPS)-induced RAW 264.7 cells.

Methods: RAW 264.7 macrophage cells were incubated in the presence of different concentrations of viscozyme component of H. *Fusiformis* (1, 2, 5, and 10 $\mu\text{g/mL}$) and changes in expression of pro-inflammatory cytokines (GM-CSF, iNOS, VEGF, COX-2) were evaluated by real-time PCR, immunoblotting. In addition, associated signal pathway including phospho (p)-pNF- κ B 65, p-pIkBa, p-p38, and p-p44/42, COX-2 were also evaluated.

Results: The viscozyme component of H. *Fusiformis* downregulated the GM-CSF, iNOS, VEGF, COX-2 mRNA expression. The augmented NO and

ROS production was decreased significantly by the administration of viscozyme. The signal intensity of p-pNF- κ B 65, p-pIkBa, p-p38, and p-p44/42 protein activated by LPS was ameliorated by the administration of viscozyme of *H. Fusiformis* in RAW 264.7 cells.

Conclusions: These results suggest that *H. Fusiformis* has potential as a therapeutic or supplementary agent for chronic inflammatory diseases.

» **RHPP-08 16:10-16:20**

» **Pneumatization of the frontal and sphenoid sinus in Korean adults: A study of using computed tomography scans**

*Department of Otolaryngology, Wonkwang University
School of Medicine*

Dong-Hwan OH, Dam-Ho LEE, Jae-Hoon LEE

Objectives: For safe sinus surgery, it is essential to understand the anatomical structure and developmental state of the paranasal sinuses. Structural abnormalities such as aplastic and marked hypoplastic sinuses may not be amenable to sinus surgery or balloon sinuplasty. The purpose of this study is to evaluate the degree of pneumatization of the frontal and sphenoid sinuses in Korean adults.

Methods: This retrospective study utilized CT images of 1190 sides from 595 Korean adults. The frontal sinus was classified into normal, hypoplasia, aplasia and unilateral hidden aplasia. The sphenoid sinus was evaluated the incidence regarding the aplasia and unilateral hidden hypoplasia.

Results: Bilateral and unilateral frontal sinus hypoplasia were observed in 8.5 % of women and 4.2% of men ($p < 0.05$), and in 3.5% of women and 4.8% of men ($p > 0.05$), respectively. Bilateral and unilateral frontal sinus aplasia were observed in 7.1% of women and 2.9% of men ($p < 0.05$), and in 7.1% of women and 5.4% of men ($p > 0.05$), respectively. Unilateral hidden frontal sinus aplasia was observed in 1.7% of women and 1.5% of men ($p > 0.05$). There was no bilateral sphenoid sinus aplasia

and only one woman had unilateral sphenoid sinus aplasia. Unilateral hidden sphenoid sinus hypoplasia was observed in 1.4% of women and 2.9% of men ($p > 0.05$).

Conclusions: Bilateral frontal sinus hypoplasia and aplasia were more common in women than men. Although the incidence of unilateral hidden frontal sinus aplasia and hidden sphenoid sinus hypoplasia was low, sinus surgeons should carefully review CT for sinus surgery or balloon sinuplasty.

» **RHPP-09 16:20-16:30**

» **Can pharyngeal packing prevent postoperative nausea and vomiting in nasal surgery**

*Department of Otolaryngology-Head and Neck
Surgery, College of Medicine, The Catholic University
of Korea*

Se Hwan HWANG, Ho Joon JIN

Objectives: We aimed to perform a meta-analysis for the efficacy of pharyngeal packing during nasal surgery in the prevention of postoperative nausea and vomiting (PONV).

Methods: Two authors independently searched the databases for relevant studies from inception to October 2017. Included studies were randomized controlled studies published in English comparing pharyngeal packing during intubation (packing group) with no packing (control group) in patients who underwent nasal surgery. Outcomes of interest included the incidence of postoperative nausea and vomiting (PONV) and throat pain during the first 24 hours post-surgery.

Results: Ten studies were included in the meta-analysis. The incidence of moderate to severe PONV in the recovery room was significantly higher in the packing group than in the control group. However, the incidence of moderate to severe PONV significantly decreased and was lower in the packing group than in the control group at 2 hours postoperative. The incidence of throat pain was higher in the packing group than in the control group until 2 hours postoperative.

Conclusions: Although pharyngeal packing significantly decreased PONV and showed no significant effect on throat pain in the middle recovery period from nasal surgery (2 hours postoperative), the use of pharyngeal packing was associated with significantly more throat pain and PONV in the initial recovery period from nasal surgery. Therefore our study showed that pharyngeal packs did not lower the risk of PONV and was associated with more throat pain in the immediate recovery period after surgery.

» **RHPP-10 16:30-16:40**

» Carotid arterial calcium scoring using upper airway computed tomography on the obstructive sleep apnea patient clinical usefulness as the predictor of cerebro-cardiovascular disease

Department of Otorhinolaryngology-Head and Neck Surgery, Dong-A University School of Medicine

**Jae-Hoon LEE, Sangjun KIM, Nam-Yoon JUNG,
Woo Yong BAE**

Objectives: The present study aimed to demonstrate the relationship between the prevalence of obstructive sleep apnea (OSA) and cerebrovascular and cardiovascular disease (CCVD) by analyzing the upper airway computed tomography (CT) of the OSA patients.

Methods: We retrospectively reviewed the medical history of OSA patients who both underwent polysomnography (PSG) and upper airway CT. The carotid arterial calcium scores (CarACS) in the upper airway CT were quantified using the modified Agatston method. CarACS was measured in the common, external, and internal carotid arteries, and total CarACS was estimated as the sum of these scores. The medical history of the patients was reviewed focusing on the comorbid diseases such as hypertension, lipid profile, blood pressure, body mass index (BMI), and the history of CCVD. Statistically, the independent t-test was used for continuous variables, and Fisher's exact test was used for binomial variables.

Results: Among the 287 patients, CCVD events occurred

in 27 patients (9.3%). One patient developed a myocardial infarction and cerebral stroke simultaneously, 13 patients had a cardiovascular event, and the remaining 13 patients developed cerebrovascular events. CarAC was found in 68 patients. The CCVD event (+) group showed significantly larger Log(CarACS+1) than that of the CCVD event (-) group (0.341 ± 0.74 vs 0.819 ± 0.98 , $P = 0.002$). The incidence of CarAC was 51.9% (14/27) in patients with CCVD events, which was significantly higher than those without CCVD events (20.8%, 54/260, $P < 0.001$).

Conclusions: CarAC was an independent risk factor for CCVD events in patients with OSA, whereas the RDI did not contribute as a risk factor. This study suggests that additional analyses of CarACS on airway CT in patients with OSA may provide information to predict CCVD.

HNPP I

RM 1-2 (Exhibition Hall B)
Chair : Hyun Jun HONG

» HNPP-01 15:50~16:00

» Diagnosing vocal disorders using cobweb clustering of the jitter, shimmer, and harmonics-to-noise ratio

¹Department of Otolaryngology-Head and Neck Surgery, Soonchunhyang University College of Medicine, ²Medical Information Communication Technology, Soonchunhyang University Asan, Republic of Korea, ³Department of Computer Science and Engineering, Soonchunhyang University, Asan, Republic of Korea

Jae Yeup JUNG¹, Yun-hee CHOI¹, Keonsoo LEE², Yunyoung NAM³, Ki Nam PARK¹, Jae Wook KIM¹, Seung Won LEE¹, Jae Hong PARK¹, Myung Jin BAN¹

Objectives: A method of predicting vocal disorders using the jitter, shimmer, and harmonics-to-noise ratio (HNR) extracted from vocal records is proposed. The cobweb clustering method was used to assess the risk of vocal disorders.

Methods: We extracted the following three features from vocal records: the jitter, shimmer, and HNR. We then clustered the collected records with similar records using the cobweb clustering method. The abnormal vocal records, which indicate a risk of vocal disorders, were identified by comparing the distances between the centroids of the clusters. We collected 147 voice records; then, we obtained 13 classes with 8 leaves from these records using the cobweb clustering method.

Results: According to the semantics of the jitter, shimmer, and HNR, the normal vocal group is the class whose centroid has the lowest jitter and shimmer, and highest

HNR. The risk of vocal disorders can be predicted by calculating the distance between the centroids.

Conclusions: Normal and abnormal vocal records can be classified by clustering. Depending on the distance from the centroid of the normal records, the risk of vocal disorders can be assessed.

» HNPP-02 16:00~16:10

» Clinical analysis of halitosis in pediatric tonsil patients

Department of Otorhinolaryngology-Head and Neck Surgery, Dongtan Sacred Heart Hospital, Hallym University College of Medicine

Seung Sik JEON, Sung Won LEE, Heejin KIM, Sung Kyun KIM, Seok Jin HONG, Seok Min HONG, Yong Bok KIM, Il-Seok PARK

Objectives: To study the volatile Sulphur compounds (VSC) halitometry profile in a pediatric patient with tonsil disease, and to evaluate the factors associated halitosis.

Methods: Totally 290 patients who underwent tonsillectomy (and/or adenoidectomy) were enrolled this study. Mean age of them was 6.95 ± 2.19 years (5~14 years), and all of them performed gas chromatography (Twin Breasor II), allergy test, and PNS X-ray preoperatively, and requested to fill up the questionnaire.

Results: Among 290 patients, 182 were boys and 108 were girls. Thirty-one (10.7%) patients had tonsilloliths, and 120 (41.4%) had a recurrent tonsillitis history. Mean H2S was 6.74 ± 8.48 (0~58.0) ppb, and mean CH3SH was 5.03 ± 6.29 (0~79.0) ppb. Presence of tonsillolith, recurrent tonsillitis history did not affect VSC. Presence of mouthbreathing and adenoid size show high VSC with statistical significance, but presence of allergy did not show any significant difference. There were significant positive correlations between patients' age and VSC levels.

Conclusions: In pediatric patients, there was a statistically significant association between halitosis and adenoid hypertrophy, mouthbreathing, rather than tonsillitis

history or tonsillolith. Therefore, adenoidectomy can help decreasing halitosis in pediatric patients.

» **HNPP-03 16:10~16:20**

» The effect of tracheotomy timing on prognosis in long-term intubated patients

Department of Otorhinolaryngology-Head and Neck Surgery, Yonsei University Wonju College of Medicine

Hyun Jong JEON, Ha Neul LEE, Hee Sung CHAE, Sung Min HAN, Chun HAN, Young Sub LEE, Cheol Hyo KU, Ji Hoon KIM, Jeong Pyo BONG

Objectives:When to perform tracheotomy for long tem intubated patients in intensive care unit(ICU) remains controversial. This study aimed to evaluate the patient's prognosis according to timing of tracheotomy after intubation in intensive care unit (ICU) patients.

Methods:Retrospective chart review was done with ICU patients who underwent tracheostomy for 3 years. Patients were divided into two groups : early trachotomy (tracheotomy performed ≤ 7 days after intubation) and late tracheotomy (tracheotomy performed > 7 days after intubation). Clinical outcomes, including mortality, postoperative complication, incidence of pneumonia, duration of mechanical ventilation, length of ICU and hospital stays were compared between two groups.

Results:Among 352 patients, 132 underwent early tracheotomy within 7 days. Early tracheotomy group had significantly shorter period in duration of mechanical ventilation, length of ICU and hospital stays. The incidence of pneumonia and postoperative complications was not significantly different but the mortality was significantly lower in early tracheotomy group.

Conclusions:Early tracheotomy showed comparable clinical outcomes relative to the late tracheotomy in patients with prolonged intubation. We suggest that early tracheotomy should be considered to reduce surgical related complication and improve patient's prognosis.

» **HNPP-04 16:20~16:30**

» Efficiency of low-level laser therapy to prevent tracheal stenosis in an animal model

¹Department of Otolaryngology-Head and Neck Surgery, Kosin University College of Medicine, Busan, South Korea

Hyoung Shin LEE^{1,2}, Van N TRAN^{2,3}, Ye-Chan LEE^{2,3}, Sung Won KIM^{1,2}, Chulho OAK^{2,4}, Junghwan OH^{2,3}, Hyun Wook KANG^{2,3}, Kang Dae LEE¹

Objectives:Tracheal stenosis may be caused by prolonged endotracheal intubation and may lead to serious airway obstruction. In this study, we evaluated the efficiency of low level laser therapy (LLLT) to prevent tracheal stenosis in an animal model of tracheal stenosis.

Methods:Diode laser of 635nm was used for LLLT. In vitro study was conducted with human trachea fibroblast cell line to verify inhibition of cell proliferation. In vivo study was conducted with 16 New Zealand White Rabbits. Tracheal injury was given 2 cm below the level of vocal cord as it was described in our previous study of tracheal stenosis animal model using diffuse laser irradiation (1470 nm, diode laser). LLLT was given to LLLT group (n=8) on the day of injury and 3 days after injury. The other 8 rabbits were not treated. Rabbits in each group (4 rabbits in each group) were sacrificed 2 weeks after initial tracheal injury. Endoscopic and histologic review of the trachea was conducted to evaluate the thickness of submucosal layer, grade of inflammation, and amount of collagen.

Results:In vitro study with human tracheal fibroblast cell revealed inhibition of fibrogenesis in LLLT group. In vivo study showed smaller thickness of submucosa, lesser amount of inflammation and smaller amount of collagen deposition in LLLT group.

Conclusions:LLLT with 635nm diode laser may be useful to prevent or ameliorate tracheal stenosis in early phase of tracheal injury which may lead to tracheal stenosis.

» **HNPP-05 16:30~16:40**

» Acoustical characteristics of menstrual and postmenopausal women

*Department of Otorhinolaryngology-Head and Neck
Surgery, Korea University*

Da-Young YIM, So-Yeon KIM, Kwang-Yun JUNG, Seung-Guk BEAK

Objectives: Menopause influences the change in voice quality, anatomical structure of larynx, and menstruation and reduction in hormone caused by menopause results in a drastic change in voice. As menopause is an important factor for determining middle-aged women's voice, this study aims to examine menopausal women's vocal pitch and loudness by using their voice quality and VRP (Voice Range Profile).

Methods: This study targeted 100 menopausal women aged in 50-69 years and 100 menstrual women aged in 20-49 years that visited the Korea University anam hospital between 2013 and 2017 years. After executing MDVP (Multi-Dimensional Voice Program), VRP (Voice Range Profile) of CSL (Computerized speechLab, Model 4500, Kay Elemetrics Corp, USA) which are acoustical examination, the voice which is a mediating variable was compared and analyzed.

Results: The result of MDVP (Multi-Dimensional Voice Program) examination indicated although there were no significant differences in jitter, shimmer, and NHR values between menopausal women and menstrual women, menopausal women's fundamental frequency was significantly low. In addition, the result of VRP (Voice Range Profile) examination showed that menopausal women's maximum frequency, minimum frequency, and maximum loudness were significantly low.

Conclusions: Menopausal women showed lower fundamental frequency, vocal pitch, and loudness than menstrual women. These results can be used as information for menopausal women when they complain of their change in voice. The results of this study will be

not only used as information related to the change in and management of voice before thyroid operation that could cause the change in vocal pitch, but also helpful in understanding the characteristics of patients' voice and voice range.

HNPP II

RM 1-2 (Exhibition Hall B)
Chair : Young-Gyu EUN

» **HNPP-06 15:50~16:00**

» Prevalence and association factors of depression and anxiety in head and neck cancer patients

*Dep. of Otolaryngology, Faculty of Medicine,
Chulalongkorn Univ.*

**Prapitphan CHAROENLUX, Napadon
TANGJATURONRASME, Worawat
RAWANGBAN, Chutima ROOMRUANGWONG**

Objectives: Our aim was to evaluate the prevalence of depression and anxiety in head and neck cancer (HNC) patients and investigate relationship between demographic/disease/physical- psychosocial factors and depression or anxiety.

Methods: We conducted a single-center cross-sectional study with self-completed questionnaire. 293 patients with previously untreated or confirmed recurrent HNC in our institution between July 2016 and June 2017 were recruited. We evaluated depression or anxiety according to the scores of Thai HADS. Univariate and multivariate analysis were performed to assess whether the presence of any factors was associated with depression or anxiety.

Results: 293 patients (210 male, 71.7% 83 female, 28.3%) were enrolled. The mean age was 58.25 (SD 14.28) yrs (range 19-92 yrs). The prevalence of anxiety was 17.75%

and depression was 16.04%. Univariate and multivariate analysis demonstrated that diagnostic time > 12 mo. (Adjusted OR(95%CI) = 4.79(1.48,15.54),p 0.009), and perception of disfigurement (Adjusted OR(95%CI) = 4.68(1.42,15.38),p 0.011) were associated with anxiety. While, education level had direct positive correlation with anxiety prevention (Adjusted OR(95%CI) = 0.13(0.03,0.57),p 0.006 and Adjusted OR(95%CI) = 0.07(0.01,0.48),p 0.007 for education level < Bachelor degree and Bachelor >= degree, respectively). For depression, univariate and multivariate analysis showed that patient age > 65 yrs (Adjusted OR(95%CI) = 4.09(1.6,10.46),p 0.003), group 4 staging (Adjusted OR(95%CI) = 3.12(1.2,8.08),p = 0.019), and fatigue (Adjusted OR(95%CI) = 5.7(1.92,16.93),p 0.002) were related to depression. While, married status was a protective factor of depression (Adjusted OR(95%CI) = 0.38(0.16,0.94),p 0.037).

Conclusions:The prevalence of anxiety and depression in HNC patients was 17.75% and 16.04%, respectively. Diagnostic time > 12 mo., and perception of disfigurement were associated with anxiety. Age > 65 years, group 4 staging, and fatigue were related to depression.

» **HNPP-07 16:00~16:10**

» The ability of conditioned media from human nasal inferior turbinate-derived mesenchymal stem cells to repair vocal fold injuries

¹Department of Otolaryngology-Head and Neck Surgery, ²College of Medicine, The Catholic University of Korea

Choung-Soo KIM¹, Hyunsu CHOI², Sung Won KIM¹, Dong-II SUN¹

Objectives:This study investigated the ability of Conditioned media(CM) from human nasal inferior turbinate-derived mesenchymal stem cell (hTMSC) to repair injured vocal folds. We used quantitative real-time polymerase chain reaction (PCR) to analyze the early phase

of wound healing, in xenograft animal models.

Methods:The right-side lamina propria of the vocal fold was injured in 30 rats. Next, CM from hTMSC was injected into half of the injured vocal folds (CM groups). As a control, phosphate-buffered saline (PBS) was injected into the other half of the injured vocal folds (PBS groups). Rat vocal folds were harvested for PCR at 1 week after injury.

Results:In the CM group, PCR showed that procollagen III expression was significantly downregulated compared with the PBS group. hyaluronan synthase, Fibronectin, transforming growth factor(TGF) - β 1 and hepatocyte growth factor were upregulated compared with the PBS group. However, the differences did not attain statistical significance

Conclusions:Injection of conditioned media into injured vocal folds showed anti fibrotic effect in early phase of wound healing. These result provide a foundation for future clinical use of CM for vocal fold regeneration.

» **HNPP-08 16:10~16:20**

» Promotion of hair follicle regeneration in cutaneous surgical wound by tonsil derived mesenchymal stem cells

¹Department of Otorhinolaryngology-Head and Neck Surgery, Pusan National University School of Medicine, ²Biomedical Research Institute, Pusan National University School of Medicine

Sung-Chan SHIN¹, Cho Hee KIM¹, Hyun-Keun KWON¹, Hyung-Sik KIM², Byung-Joo LEE¹

Objectives:As tissue engineering and regenerative medicine has evolved recently, stem cell therapy has studied in the field of impaired wound healing. Previously, we have studied the efficacy of tonsil derived mesenchymal stem cells(T- MSCs) and excellent regenerative potential of T-MSCs. This study is to evaluate the regenerative effect of surgical cutaneous wound and regeneration of hair follicle by T-MSCs.

Methods:Two distinct cutaneous surgical defects were generated in the dorsum of thirty C57BL6 mice. Each wound was treated with T-MSCs or phosphate buffered saline (PBS), respectively. After sacrifice, the skin and subcutaneous tissues around the surgical defect were harvested and assessed for degree of wound healing and hair follicle regeneration. We identified variable protein and miRNA of T-MSCs related which have potential to promote hair follicle regeneration using next generation sequencing. Also, in vitro study, T-MSCs were co-cultured with human dermal papilla cell-line and expression of Wnt-signal pathway related markers were assessed.

Results:Promoted gross hair follicle regeneration was noted in T-MSC treated wound compared to control group. Also, in hematoxylin-eosin stain, more regenerated hair follicles were observed in the margin of cutaneous wound rather than center of wound. In vitro study, human dermal papilla cells were proliferated in T-MSC co-cultured group.

Conclusions:T-MSCs have regenerative potential of hair follicle during surgical cutaneous wound healing process.

» **HNPP-09 16:20-16:30**

» Advantage of mastoid tip removal in parotid cancer

*Department of Otolaryngology-HNS, Institute for
Medical Science, Chonbuk National University-
Chonbuk National University Hospital, Chonbuk, 560-
182, Korea*

**June Sun KIM, MD, Yong Tae HONG, MD, Ki
Hwan HONG, MD**

Objectives:The primary treatment option for parotid carcinomas is surgery to eradicate the tumor while preserving the facial nerve function. Advanced stage parotid carcinomas can involve either the facial nerve or the adjacent temporal bone. However, there are few reports about temporal bone surgeries for managing parotid malignancies. We are reporting cases of advanced parotid cancers for which we performed mastoid tip removal

and offer some suggestions for management strategies in advanced parotid cancer

Methods:We experienced three cases of advanced parotid cancer managed with mastoid tip removal procedure. This procedure was used to identify the facial nerve, exposing the stylomastoid foramen, and removing the tumor completely in advanced parotid cancer. The facial nerve function and oncologic result after surgery was reviewed

Results:Mastoid tip removal was safely done in all cases. Applying this procedure we could not only find the main trunk of the nerve safely, but also find the perineural spread of cancer near the stylomastoid foramen. Postoperative facial function was satisfactory, except one case who had preoperative complete facial nerve paralysis. All patients had no locoregional recurrence during the follow up. We provide algorithm for advanced parotid cancer using mastoid tip removal procedure

Conclusions:There are few reports about temporal bone surgeries for managing parotid malignancies. Our findings will aid in treating advanced parotid cancer both for good facial nerve function and better oncologic outcome.

» **HNPP-10 16:30-16:40**

» Effect of lidocaine nebulizer compared with NSS nebulizer for reduced cough symptom and pain in early tracheostomy care

*Dep. of Otorhinolaryngolog, Chulalongkorn Univ.
College of medicine*

**Kornkla PANPRAPAKORN,
Worawat RAWANGBAN, Napadon
TANGJATURONRASME**

Objectives:Patients who performed tracheostomy often had cough problem because tracheostomy tube stimulates cough reflex in trachea and early post-operative pain. Normally, patients will receive normal saline nebulizer via tracheostomy tube. The goal of this research is to prove that the use of lidocaine together with normal saline nebulization through tracheostoma will be more effective

to reduce cough and pain symptom compare to saline nebulization alone.

Methods: This prospective, cross-over study was conducted in King Chulalongkorn Memorial Hospital, department of Otolaryngology between June 2016 and June 2017. Patients who met inclusion criteria were performed tracheostomy from upper airway obstruction. Our subjects were randomly received different types of nebulizer substance (5 ml. of normal saline or 1% lidocaine without adrenaline 4 ml. mixed with 1 ml. of normal saline) at 10 AM by. Another substance differing from nebulizer substance at 10 AM was nebulized to the same patient at 6 PM. Patients scored level of pain and cough symptoms before nebulization and 60 to 90 minutes after nebulization by using Visual analogue scale (VAS) score.

Results: 32 patients who performed tracheostomy (29 cancer, 3 bilateral vocal fold paralysis) were enrolled. The mean change of cough score was -2.09 ± 2.15 in lidocaine and -0.88 ± 1.96 in normal saline. There was statistically significant difference in pre- and post-treatment of VAS scores between two groups ($p = 0.019$). We excluded 10 patient who required pain killer drug in pain score. The mean change of pain score was -1.45 ± 1.53 in lidocaine and -0.82 ± 1.87 in normal saline. There was statistically significant difference in pre- and post-of VAS scores ($p < 0.001$) only lidocaine group. No complication and side effect of lidocaine in our study.

Conclusions: 1% lidocaine without adrenaline mixed with normal saline nebulizer had significant effect to reduce cough and pain symptom in early tracheostomy patients compared with normal saline.

» **HNPP-11 16:40-16:50**

» **Efficacy of pediatric voice therapy with voice disorder**

Department of otorhinolaryngology-Head and neck surgery, Inje University Paik-Hospital

Min Yeong KIM, Yun Gyeong SO, Jea Geun JO

Objectives: Benign vocal fold nodules affect 12% to 22% of the pediatric population. Voice therapy is a recommended children with vocal nodules. Voice therapy prefer to change the way one uses the vocal mechanism. But it is difficult to recognize their voice problems and lack of motivation and low compliance for voice therapy. The aim of this study to discussion the effect of voice therapy and the factors affect the efficacy of voice therapy for childrens with vocal noduls.

(1) Was there a significant difference before and after voice therapy? (2) What were the factors that affect the efficacy of voice therapy? (3) What was the compliance to voice therapy and the reasons dropped out during voice therapy?

Methods: This study included 22 childrens (12 boys and 10 girls) diagnosed with vocal nodule enrolled between March 2015 to December 2017. Age ranged from 3 to 11 years with a mean age of 7 years. Eight childrens less than 1 year, thirteen childrens more than 1 year, one children unknown which duration of voice change. All subjective received perceptual, acoustical, laryngoscopy before or before and after voice therapy. Subjective improvement confirmed Pediatric Voice Handicap Index (P-VHI) survey, asking about their voice satisfaction. Voice therapy was combined with?? Indirect and direct voice therapy. Subjective voice assessment data of patients before and after voice therapy were compared using Paired t test.

Results: Pre and Post therapy showed significant improvement in all parameters excluded NHR, MPT. The effect of voice therapy according to various factors (sex, age, voice change duration) was examined on the basis of VHI-P score. According to sex, the boys showed better than girls about? VHI-P score. According to age, the VHI-P score improved in the school aged group compared to the preschool age children, duration of voice changed more than 1 year.

Conclusions: children were low compliance to voice therapy, but high satisfied with voice therapy and improving objective voice parameters. It is thought that otorhinolaryngologist, SLP, families and teachers need to change their perception and positive support pediatric voice therapy.

Instruction Course

April 28 (Sat)

[IC 1]	10:30-11:10 RM 2-1 (Flamingo)
Basics of tissue engineering: What is stem cell, growth factor and scaffold? How do we prepare them? <i>Seong Keun KWON (Seoul National Univ.)</i>	
[IC 2]	10:30-11:10 RM 2-2 (Skylark)
Stapes surgery <i>Ho-Ki LEE (Soree Ear Clinic)</i>	
[IC 3]	10:30-11:10 RM 2-3 (White Heron)
Surgical tips for the management of the wide nasal base <i>Ji Yun CHOI (Chosun Univ.)</i>	
[IC 4]	11:30-12:10 RM 2-2 (Skylark)
Tips and tricks in laryngeal framework surgery <i>Kumud Kumar HANDA (Chairman Dept. of ENT & Head Neck Surgery, India)</i>	
[IC 5]	11:30-12:10 RM 2-3 (White Heron)
Restoring the functionally devastated nasal airway after septorhinoplasty <i>Hong Ryul JIN, Jong Sook YI (Dr Jins Premium Nose Clinic)</i>	
[IC 6]	11:30-12:10 RM 2-4 (Swan)
Surgical treatment of recurrent nasopharyngeal carcinoma <i>Jimmy Yu-wai CHAN (The Univ. of Hong Kong, Hong Kong)</i>	
[IC 7]	13:30-14:10 RM 2-4 (Swan)
Personal tips in basic and advanced techniques of septoplasty <i>Yong Ju JANG (Univ. of Ulsan)</i>	

Video Lecture

April 28 (Sat)

		RM 2-5 (Crane)
TIME	TITLE	PRESENTER
10:30-12:40	Endoscopic tympanoplasty	<i>Sung il NAM (Keimyung Univ.)</i>
	In-office cryosurgery in the nasal passage for patients with chronic rhinitis	<i>Do-Yeon CHO (Univ. of Alabama at Birmingham, USA)</i>
	Limited palatal muscle resection: A novel palatopharyngoplasty technique for OSA	<i>Kyu-Sup CHO (Pusan National Univ.)</i>
	Endoscopic transseptal approach - A case of meningioma	<i>Sung Won KIM (The Catholic Univ. of Korea)</i>
	Costal cartilage rhinoplasty	<i>Ji YUN CHOI (Chosun Univ.)</i>
	Immediate nasal reconstruction after infected gore-tex implant removal	<i>Hong Ryul JIN, Jong Sook YI (Dr. Jins Premium Nose Clinic)</i>
	Basic open rhinoplasty (from incision to closure)	<i>Kun Hee LEE (Kyung Hee Univ.)</i>
	Bilateral modified nasoseptal "rescue" flaps in the endoscopic endonasal transsphenoidal approach	<i>Sung Won KIM (The Catholic Univ. of Korea)</i>
	Ultrasound diagnosis for cervical lymph node metastasis of head and neck squamous cell carcinoma	<i>Madoka Kaneko FURUKAWA (Kanagawa Cancer Center, Japan)</i>
	Trans-oral robotic thyroidectomy preclinical simulation in cadavers	<i>So-Yoon LEE (CHA Univ.)</i>
	How to harvest fasciocutaneous free flap from anterolateral thigh area	<i>Won Shik KIM (Seoul National Univ.)</i>
	TORS radical tonsillectomy, base of tongue resection and retropharyngeal lymph node dissection with the da vinci SP robot	<i>Raymond TSANG (Univ. of Hong Kong, Hong Kong)</i>
	Vascular bypass and craniofacial resection for locally advanced nasopharyngeal carcinoma	<i>Jimmy Yu-wai CHAN (Univ. of Hong Kong, Hong Kong)</i>
12:40-13:30	Lunch	
13:30-15:30	Repeat	

IC 1

RM 2-1 (Flamingo)

» 10:30-11:10

» Basics of tissue engineering: What is stem cell, growth factor and scaffold? How do we prepare them?

Seoul National Univ.
Seong Keun KWON

The goals of tissue engineering are development of functional cell, tissue and organ substitutes to repair, replace or enhance biological function that has been lost. In this session, I will cover the basic three factors in tissue engineering. Tissue engineering is the use of a combination of cells, engineering and materials methods, and suitable biochemical and physicochemical factors to improve or replace biological tissues. The term regenerative medicine is often used synonymously with tissue engineering, although those involved in regenerative medicine place more emphasis on the use of stem cells or progenitor cells to produce tissues. To enhance the regenerative capability of stem cell, multiple methods were used to reinforce the function of stem cells. Tissue engineering also involves the use of a tissue scaffold for the formation of new viable tissue for a medical purpose. Often, the scaffolds require certain mechanical and structural properties for proper functioning according to the tissue that are going to be regenerated. Growth factors are utilized to direct the tissue regeneration. Due to short half life of the growth factor, several methods are utilized to release growth factor in sustained manner.

IC 2

RM 2-2 (Skylark)

» 10:30-11:10

» Stapes surgery

Soree Ear Clinic
Ho-Ki LEE

The goal of stapes surgery is to re-establish sound transmission through an ossicular chain stiffened due to stapes fixation. Various techniques have been used to accomplish this goal, including stapes mobilization, fragmentation, fenestration and partial as well as total footplate removal. Causes of stapes fixation are otosclerosis, congenital stapedia fixation, chronic otitis media, trauma, etc. In the stapes surgery, we have to consider the degree of hearing loss, bilateral or unilateral hearing loss, the patient's age, general condition, and anesthesia. Contraindications of stapes surgery are the only hearing ear, unresolved inflammation, a perforated eardrum, poor Eustachian tube function. Author will discuss basic surgical techniques of stapes surgery with a Skitter drill or LASER, and problem cases, such as malleo-stapedotomy, revision stapedotomy.

IC 3

RM 2-3 (White Heron)

» 10:30-11:10

» Surgical tips for the management of the wide nasal base

Chosun Univ.
Ji Yun CHOI

Many Asians have noses with a broad alar base. Alar base surgery create an aesthetically balanced alar base is an

important supplementary surgical technique in rhinoplasty performed on Asian patients. For proper assessment of the nasal base width, a clear distinction should be made between the width of the alar base and the degree of alar flare. Nasal sill reduction which involves the complete resection of skin and underlying soft tissues at the location of the nostril sill made the alar base narrower. Lateral alar reduction from the base of the alar lobule to just above the alar facial groove will improve excessive alar flare, but will not narrow the nostril. Our goal is to accomplish a natural result and preserve the natural curvature of the lateral alar and function. Regardless of the type of modification, a conservative approach to alar base refinement is essential. Nasal base modification can improve nostril shape and orientation, reduce alar flaring, improve nasal base width, correct nasal hooding, improve symmetry and create overall facial harmony. For the correction of alar rim deformities, careful examination, consultation, analysis and consider the condition of the skin are essential. Understanding of the ala and surrounding tissue, supporting of lower lateral cartilage, selecting the proper technique produces functionally and aesthetically good results.

IC 4

RM 2-2 (Skylark)

» 11:30-12:10

» Tips and tricks in laryngeal framework surgery

Chairman Dept. of ENT & Head Neck Surgery

Kumud Kumar HANDA

This instructional course will familiarise all audience with different Type of thyroplasties Type 1 to Type 4 including indications, technique and possible complications A few indicative case studies will also be shown.

IC 5

RM 2-3 (White Heron)

» 11:30-12:10

» Restoring the functionally devastated nasal airway after septorhinoplasty

Dr Jins Premium Nose Clinic

Hong Ryul JIN, Jong Sook YI

Nasal obstruction after rhinoplasty is not uncommon, and differential diagnosis is quite challenging. Exact sites of obstruction, anatomic cause of the problem, and a plan for correction are important factors of consultation. Often, scarring, altered nasal anatomy, and disrupted tissue plane by previous surgeries complicates finding out the exact sites and causes of obstruction. The common anatomic sites of nasal obstruction after rhinoplasty can be divided into septum, middle vault, tip/lateral crura, external valve, collapsed dorsum, and mucosal lining. They are mostly static obstruction, but sometimes dynamic obstruction does occur. Representative anatomic causes of obstruction are remained/newly developed septal deformities, upper lateral cartilage collapse after aggressive hump removal, deformed/paradoxical concavity of the lateral crura, cicatricial stenosis of the nostril, and mucosal hypertrophy. Surgical correction methods include septal correction, spreader graft, flaring suture, alar batten graft, lateral crural strut graft, z-plasty/composite graft, external epithelial flap, cartilage L-strut reconstruction, bony-cartilaginous dorsum graft, and medical or surgical treatment of mucosal hypertrophy. Restoring the impaired nasal airway after prior nasal surgery remains a challenging part of revision rhinoplasty. Preserving the supportive structure of the nose during primary rhinoplasty is most important for prevention. Correction starts with exact analysis of sites and etiology of the problem and needs structural restoration of the support with autologous tissue along the septum, dorsum, and lateral nasal wall.

IC 6

RM 2-4 (Swan)

» 11:30-12:10

» Surgical treatment of recurrent nasopharyngeal carcinoma

Hong Kong

Jimmy Yu-wai CHAN

Treatment of recurrent nasopharyngeal carcinoma is challenging. Re-irradiation is associated with high risk of cumulative toxicities and the oncological outcome of radio-resistant strains is questionable. On the other hand, surgical resection of tumours in the nasopharynx is technically demanding because of its intrinsic anatomical location and the post-radiation effects of the region. Maxillary swing operation provides a wide access to bilateral nasopharynx and ipsilateral parapharyngeal space, allowing resection of tumours with wide margins. This is important, as studies showed that resection margin status is one of the most important independent prognostic factors influencing the outcome of treatment. With improving techniques, post-operative morbidities are reduced and quality of life of patients after salvage nasopharyngectomy is improving. With advancing technology, early recurrent tumours in the nasopharynx can be resected via the endoscopic endonasal approach or the transoral robotic assisted approach. In selected patients, early experience shows that the local tumour control and overall survival is comparable to the open approach. On the other hand, locally advanced tumours in the nasopharynx that encases the internal carotid artery or invaded the skull base, which are considered inoperable in the past, can now be removed first by securing the cerebral perfusion via the extracranial intracranial vascular bypass, followed by a second stage cranial facial resection and reconstruction. Further studies are required to investigate the best modality of investigation to allow early detection of tumour recurrence after previous

radiotherapy, as well as to personalize the treatment protocol in order to maximize the treatment outcome for patients with recurrent nasopharyngeal carcinoma.

IC 7

RM 2-4 (Swan)

» 13:30-14:10

» Personal tips in basic and advanced techniques of septoplasty

Univ. of Ulsan

Yong Ju JANG

Nasal septal deviation is one of the most common nasal pathology causing disturbed nasal breathing function. Septal deformities requiring surgical correction varies greatly in their shapes and locations, thus mandating a tailored approach for successful correction. In this lecture, author's various septoplasty techniques including conventional septoplasty, cutting and suture, cartilaginous batten grafting, interposition batten graft, bony batten grafting, and modified extracorporeal septoplasty will be introduced. Upon completion of this course, the participants will have better understanding on the indications, technical details, and pros and cons of each specific technique.

VL I

RM 2-5 (Crane)

» Endoscopic tympanoplasty

Keimyung Univ.

Sung il NAM

I would like to describe surgical steps to perform endoscopic tympanoplasty. Virtually all pathologies of the tympanic membrane, from small perforations to large tympanic membrane replacement can be addressed endoscopically.

VL II

RM 2-5 (Crane)

» In-office cryosurgery in the nasal passage for patients with chronic rhinitis

Univ. of Valencia, Spain

Do-Yeon CHO

Endoscopic posterior nasal neurectomy (endoscopic vidian neurectomy, vidian neurectomy, posterior nasal neurectomy) has been described as a well-tolerated, safe and efficacious surgical treatment of chronic rhinitis, but this requires surgical approach under general anesthesia. A novel cryotherapy device (ClariFix™; Arrinex, Inc., Redwood City, CA) has been developed for office-based cryosurgical ablation of the posterior nasal nerve (PNN) region, which requires minimal training and can be performed under local anesthesia and was recently approved by US FDA. In this video, we would like to demonstrate a patient with intractable chronic rhinitis, successfully treated with cryoablative technique. 71-year-old Caucasian male came to clinic with intractable chronic rhinitis, constant drainage from both nostrils especially while eating and exercising.

He tried multiple prescribed and over-the-counter nasal sprays for the past 12 months without any relief. Therefore the decision was made to perform the cryoablation of the PNN region. The intervention was performed using a novel cryotherapy device called the ClariFix device. The device is a hand-held, endoscopically placed cryoprobe through which nitrous oxide cryogen is delivered at the tip of a closed system. The tip of the cryodevice was applied endoscopically to the posterior middle meatus, and the surgeon then activated the cryogen to perform cryoablation of the mucosa in the region of the PNN for 30 seconds. The cryogen cartridge was then changed and the contralateral side was treated identically for 30 seconds. The patient then returned for follow-up nasal endoscopy at four months postprocedure. His symptoms have been significantly improved since the procedure and the patient is not currently using any nasal spray.

VL III

RM 2-5 (Crane)

» Limited palatal muscle resection: A novel palatopharyngoplasty technique for OSA

Pusan National Univ.

Kyu-Sup CHO

The success of surgery in the treatment of obstructive sleep apnea (OSA) depends on the accurate diagnosis of the sites of obstruction and the appropriate selection of procedures to address these sites. The palatal level is one of the major areas of obstruction in the upper airway contributing to OSA and uvulopalatopharyngoplasty (UPPP) remains the most commonly utilized surgical procedure for treating OSA. However, the long-term success rate of UPPP was no greater than 50% in unselected patients with OSA. Furthermore, UPPP has been associated with complications such as velopharyngeal insufficiency and nasopharyngeal

stenosis. Therefore, many modifications of UPPP have been proposed to contend with anatomical variations of the pharynx and minimize morbidities. In a recent study, limited palatal muscle resection (LPMR), a modified technique of UPPP, showed significant improvement regardless of tonsil size in subjective and objective outcomes of OSA patients with normal postoperative pharyngeal function. In this video lecture, we present the surgical techniques of LPMR in the different cases and preoperative and postoperative DISE findings.

VL IV

RM 2-5 (Crane)

» Endoscopic transseptal approach - A case of meningioma

The Catholic Univ. of Korea
Sung Won KIM

Endoscopic endonasal skull base surgery is becoming the standard surgical method in operations involving the cranial base. The nasoseptal flap was introduced by Hadad et al. to decrease the incidence of cerebrospinal fluid leakage. A modified version has since proven useful in various endoscopic skull base approaches. In addition, the “two-nostrils-four-hands” technique⁶ facilitated the manipulation of surgical instruments and improved access to the lateral sellar region, thus resulting in better surgical outcomes. Given concerns about the postoperative quality of life, this less destructive surgical method has been evaluated, especially in patients with small sellar tumors. However, among skull base tumors, those located in the middle cranial fossa extending to the pterygopalatine or infratemporal fossa, remain the most difficult to access surgically.¹¹ In patients with large midline benign tumors, simple removal methods can result in considerable septal defects. Similarly, treatment of patients with anterolateral/

lateral tumors located in the orbit areas causes a difficult instrument maneuverability, and remains a major challenge. In this video lecture, we presented the treatment of a meningioma at our hospital. The endoscopic transseptal approach included the creation of a bilateral nasoseptal flap using the “two-nostrils-four-hands technique”.

VL V

RM 2-5 (Crane)

» Costal cartilage rhinoplasty

Chosun Univ.
Ji Yun CHOI

Augmentation rhinoplasty is the one of the most common aesthetic procedures in Asian countries because of relative flat and wide Asian noses. However, the augmentation rhinoplasty should be conservative, preserving the ethnicity to make the nose very natural and harmonious with other facial units. Analyzing the face, any facial asymmetry must be noticed and notified to the patient before the surgery, because the augmentation may worsen or accentuate the pre-existing facial asymmetry. For a correct designing of implant, it is important to assess not only the external shape of the nose, but also each patient's anatomical characteristics. The ideal nasal implant should be readily available, inexpensive, insert, nontoxic, noncarcinogenic, sterilizable, easy to sculpt, and able to provide volume and mechanical support. Autografts advantages are numerous : normal consistency, flexibility, long term survival, low rates of infection and unquestionable biocompatibility. The limitations of autografts are the limited quantity of available tissue and the morbidity associated with tissue harvest. Permissible size of implant in an individual patient, will depend on quality and compliance of the relevant skin envelope, but generally, major dorsal augmentation over 7mm in thickness is not recommended with alloplastic

material. Excessive augmentation of the radix area should be avoided in patients with a flat forehead. The proximal end of the implant should be carefully tapered to accommodate to this area and not be visible or palpable. The shape of the implant varies greatly according to patient's nasal anatomy or surgeon's preferences and different tip techniques. Elevating the soft tissue in a dissection plane immediately above the perichondrium and deep to the periosteum is of the most importance. It is important to dissect a symmetric yet tight pocket to minimize implant mobility and displacement. Recipient bed should be handled gently and every effort should be made to avoid hematoma formation. To avoid early contamination and delayed infection, it is advised that the incision should be positioned as far away from the implant.

VL VI

RM 2-5 (Crane)

» Immediate nasal reconstruction after infected gore-tex implant removal

Dr. Jins Premiun Nose Clinic
Hong Ryul JIN, Jong Sook YI

This video lecture demonstrates an immediate nasal reconstruction case after infected Gore-Tex dorsal implant removal. Techniques of rib cartilage harvesting and carving, removal of the implant and infection control, reconstruction of the septal support, and restoration of the destroyed lower lateral cartilage are serially shown. Comparison of the preoperative and long-term postoperative views of the nose will clearly demonstrate how each technique influenced the final nasal shape.

VL VII

RM 2-5 (Crane)

» Basic open rhinoplasty (from incision to closure)

Kyung Hee Univ.
Kun Hee LEE

Rhinoplasty is considered one of the most difficult surgical procedures in facial plastic surgery. Although its detailed technique is relatively easy there exists steep learning curve and patient-to-patient variation. Open rhinoplasty technique has been criticized that incision scar is noticeable. The scar is formed in not only transcolumellar incision but also the lateral margin of columella which extended marginal incision from the transcolumellar incision. In many cases patients don't be bothered by the scar but meticulous incision and careful suturing can avoid this problem. This video contains basic open rhinoplasty case: incision, dissection, dorsal augmentation, tip pasty, closure.

VL VIII

RM 2-5 (Crane)

» Bilateral modified nasoseptal "rescue" flaps in the endoscopic endonasal transsphenoidal approach

The Catholic Univ. of Korea
Sung Won KIM

Nasoseptal flap is used to reconstruct defects in the skull base after use of the endoscopic endonasal transsphenoidal approach. The introduction of the nasoseptal flap has reduced the incidence of cerebrospinal fluid leaks in patients with large skull base defects. However, in most intrasellar tumor cases an intraoperative cerebrospinal fluid leak is not

expected. Patients with small sellar lesions have no need for reconstruction of the sellar floor. Thus, conventional nasoseptal flap is too invasive in these cases. Conventional nasoseptal flap has several complications: a long operative time; nasal crusting, discharge, and obstruction; and olfactory disorders. Zanation et al. introduced the nasoseptal “rescue” flap, which consists of partially harvesting the most superior and posterior aspect of the flap to preserve its vascular pedicle. The nasoseptal rescue flap could be fully harvested when the sellar reconstruction is needed to close an unexpected cerebrospinal fluid leakage. For a better postoperative nasal function and preservation of wide exposure, we have raised bilateral modified nasoseptal rescue flaps in the endoscopic endonasal transsphenoidal approach and used them in a variety of settings. In this video lecture, we presented the surgical procedure of the bilateral modified nasoseptal rescue flaps in the endoscopic endonasal transsphenoidal approach.

VL IX

RM 2-5 (Crane)

» Ultrasound diagnosis for cervical lymph node metastasis of head and neck squamous cell carcinoma

Kanagawa Cancer Center, Japan

Madoka K Furukawa

Ultrasonography has many advantages over other diagnostic imaging modalities.: non-invasive and radiation-free investigation, the unnecessary of pre-treatment or troublesome preparations, the possibility of real time dynamic assessment, portability, accurate guidance for intervention procedures, cost effectiveness. And ultrasonography allows evaluation of lymph nodes of less than 10 mm diameter which cannot be assessed by CT or MRI. This suggests that ultrasonography is indispensable

for metastasis evaluation in the patients with head and neck cancer. In patients with head and neck cancer, to avoid both of false –negative nodes and possibility of overtreatment for neck is very important. To determine the ultrasonography diagnostic criteria which enable improving the specificity and accuracy of neck examination especially in assessing the small lymph node with less than 10mm thickness, the normal lymph node structures and those ultrasound findings and primary changes of lymph node metastasis were observed. As results, the thickness of lymph node, the deviation of fatty hilum (echogenic hilum) and existence of the metastatic foci inside of lymph nodes were the characteristic finding of early stage of lymph node metastases of head and neck squamous cell carcinoma “The Japan study group of head and neck ultrasound” confirmed this diagnostic criterion was effective for clinical use in any institutes, and now try to hold the annual seminars and lectures for young otolaryngologist - head and neck surgeons about the methods and criteria of ultrasonography for early detection of lymph node metastasis of the head and neck squamous cell carcinoma. The details of these criteria, diagnostic methods and activity for training would be introduced in this video lecture.

VL X

RM 2-5 (Crane)

» Trans-oral robotic thyroidectomy preclinical simulation in cadavers

CHA Univ.

So-Yoon LEE

Generally, thyroidectomy was performed through an open trans-cervical incision. However, recent innovation in the surgical technique of thyroidectomy has offered the opportunity to reduce the patient’s burden from prominent surgical scars in the neck. The high interest toward

postoperative cosmesis in the general population and the increased detection rate of thyroid cancer due to improved thyroid screening protocols in the Korean society led to the development of the robotic thyroidectomy technique. And the interest in trans-oral thyroidectomy (TOT) is increasing and many attempts have been recently made by many institutions. Our team has recently performed cadaver dissections for trans-oral Robotic thyroidectomy prior to human appliance in 10 cadavers. Da Vinci Xi system was used and 3 arms were used. Additional extra-incision outside mouth was not needed. We will explain detailed procedures of TOT by using Da Vinci Xi system.

VL XI

RM 2-5 (Crane)

» How to harvest fasciocutaneous free flap from anterolateral thigh area

Seoul National Univ.
Won Shik KIM

Free flap reconstruction is essential in the management of the patients with advanced head and neck cancer. As a head and neck surgeon, the anatomical unfamiliarity beyond head and neck area is one of the major obstacles for the beginner of free flap reconstruction. After learning this video lecture for the harvest of fasciocutaneous free flap from anterolateral thigh area, the knowledge and the skill for free flap can be obtained, especially for the beginners.

VL XII

RM 2-5 (Crane)

» TORS radical tonsillectomy, base of tongue resection and retropharyngeal lymph node dissection with the da vinci SP robot

Univ. of Hong Kong, Hong Kong
Raymond TSANG

The video demonstrated 3 transoral robotic surgery procedures using the new da Vinci SP robot in the first clinical trial of the da Vinci SP robot. The new da Vinci SP robot has a 3D HD endoscope with 36 mm robotic arms all inserted in a 2.5 cm cannula. The arms opens up in the oral cavity to achieve triangulation of the instruments. It was possible to employ all 3 robot arms during the procedures. The 3rd robotic arms is of special benefit to allow better retraction of the surgical sites while under the console surgeons control. The study concluded the new da Vinci SP surgical robot is as safe and effective in performing TORS procedures as the previous generation sugical robots. The new SP robot also has an added advantage of able to deploy the 3rd arm to assist the operation and give the robotic surgeon more flexibility and versatility during the surgical procedures.

VL XIII

RM 2-5 (Crane)

» Vascular bypass and craniofacial resection for locally advanced nasopharyngeal carcinoma

Univ. of Hong Kong, Hong Kong
Jimmy Yu-wai CHAN

Management of locally advanced recurrent nasopharyngeal

carcinoma is challenging. For tumours that have encased the cervical or petrous segment of the internal carotid artery, we surgically salvage the tumour by securing the cerebral perfusion using an extracranial intracranial vascular bypass, followed by a second stage craniofacial resection. This strategy allows wide resection of the tumour en-bloc with the internal carotid artery, without jeopardizing the blood supply to the brain. Between 2011 and 2017, 48 patients with rT3 and rT4 tumours were treated. Clear resection margin was achieved in 52.2%. Mean follow-up duration was 40.4 months. Overall 5-year survival was 53%. There was one patient who developed thrombosis of the bypass graft 12 days after the second stage surgery. The proposed surgical treatment allows surgical salvage of locally advanced recurrent nasopharyngeal carcinoma that are considered inoperable in the past.

Plenary Session

RM 4-2 (Convention B)

Chair : Hun-Jong DHONG

Plenary Session

» 09:20-10:00

» 4천만명 행태/기호 Big Data를 우리는 어떻게 활용할 것인가?

Wider Planet Inc www.widerplanet.com

Kyo-Sik KOO

1. Big Data-Tech이란 무엇인가?
2. 침대는 가구가 아니다? 마케팅은 컨셉이 아니다?
3. Big Data-Tech 활용사례

Program at a Glance

April 29 (Sun)

Floor	Convention 4F			Convention 3F		
Room	RM 4-1 (Convention A)	RM 4-2 (Convention B)	RM 4-3 (Convention C)	RM 3-1 (Emerald A)	RM 3-2 (Emerald B)	RM 3-3 (Diamond)
7:00						
7:30						
8:00						
8:30	OTOP 8 (Basic II)	RHOP 7 (Olfaction)	HNOP 8 (Larynx cancer)			
9:00				임상특강 I Korean		
9:30	OT-SP 4 (Hearing preservation and restoration in skull base lesion)	RH-SP 4 (Recent advances in obstructive sleep apnea)	HN-SP 3 (Cutting edge in HN research)	개회식 & 축하 임상특강 II Korean		ULHO (Head & Neck Ultrasound Intensive Course) Korean
10:00				전체 특강		
10:30	Coffee Break			Korean		Coffee Break
11:00		RH-KL 3 (Nasal irrigation and instrumentations in various maxillary anastomoses)	HN-KL 3 (Elective neck management in oral cavity cancer)	Coffee Break 임상특강 III Korean		
11:30	OT-RT 1 (Management of recurrent COM: How I do it?)			교양특강 I Korean		ULHO (Head & Neck Ultrasound Intensive Course) Korean
12:00		RH-SP 5 (What a precision medicine means and it's application for rhinologic field)	HN-SP 4 (Minimally invasive surgery)	정책특강 Korean		
12:30						
13:00	General Assembly	Luncheon Symposium (Boryung Pharm)	Luncheon	Luncheon Symposium (YUHAN)		
13:30						
14:00	OT-SP 5 (BPPV: from basic to evidence- based clinical approach)	RH-SP 6 (Tumor and Skullbase surgery)	HN-SP 5 (Current issue of thyroid gland)	임상특강 IV Korean	임상특강 V Korean	ORL-연구 활성화 심포지움 Korean
14:30				임상특강 VI Korean	심포지움 I Korean	
15:00	Coffee Break					
15:30				Coffee Break		
16:00	OT-SP 6 (The inner ear imaging: from animal to human application)	RH-SP 7 (New Horizon in Allergic Rhinitis)	HN-SP 6 (The changing fields of laryngopharyngeal reflux: speculations as to the future)	심포지움 II Korean	심포지움 III Korean	
16:30						
17:00		Closing Ceremony (Best Oral/Poster Presentation Awards)				
17:30						
18:00						

Program at a Glance

April 29 (Sun)

Floor	Hotel 2F						Convention 1F
Room	RM 2-1 (Flamingo)	RM 2-2 (Skylark)	RM 2-3 (White Heron)	RM 2-5 (Crane)	RM 2-4 (Swan)	RM 2-6 (Peacock)	RM 1-1 (Exh. B)
7:00							Poster Exhibition
7:30							
8:00							
8:30	OTOP 9 (Inner Ear II)	RHOP 8 (Rhinosinusitis (Basic) II)	HNOP 9 (Oropharynx)	IC 8 (Subtle Glottic insufficiency and Diagnostic Vocal Fold Augmentation)			Poster Exhibition
9:00							
9:30	OTOP 10 (Vestibular Disorder I)	RHOP 9 (Allergy)	HNOP 10 (Oral cavity)	IC 9 (BAHA: The importance of using Super Power instruments in BAHS patients)			
10:00							
10:30	Coffee Break						Coffee Break
11:00	OTOP 11 (Auditory Rehab I)	RHOP 10 (Rhinosinusitis II)	HNOP 11 (Tracheoesophagus)	IC 10 (Basic principles of Laryngo-microsurgery)	MOU KORL-HNS & Taiwan Society of Otorhinolaryngology Head and Neck Surgery MOU Signing Ceremony	ORL-간행워크샵 Korean	
11:30							
12:00	OTOP 12 (Auditory Rehab II)	RHOP 11 (Endoscopic Sinus Surgery)	HNOP 12 (Thyroid II)	IC 11 (Dysphagia in head and neck cancer therapy)			Poster Exhibition
12:30							
13:00							
13:30							
14:00	OTOP 13 (Otitis Media & Cholestatoma II)	RHOP 12 (Others (Clinical & Basic))	HNOP 13 (Other Head and Neck)	IC 12 (Surgical technique for cochlear implantation from basic to advanced)			
14:30				IC 13 (Retrosigmoid approach for acoustic tumor removal surgical landmarks and tips)			
15:00	Coffee Break						
15:30				IC 14 (Easy and Safe Fiberoptic Laryngeal Laser Surgery (FLS) Under Local Anesthesia)			Poster Exhibition
16:00	OTOP 14 (Vestibular Disorder II)	RHOP 13 (Sleep Related Breathing Disorders II)	HNOP 14 (Neck)	IC 15 (Beginning and Setting up Transoral Endoscopic Thyroid Surgery From A to Z)			
16:30							
17:00							
17:30							
18:00							

OTSP IV

RM 4-1 (Convention A)

Chair : Jong-Woo CHUNG, Shin-ichi KANEMARU

**Hearing Preservation and Restoration
in Skull Base Lesion**

» 08:50-09:10

» Hearing deterioration in vestibular schwannoma

*Department of Otorhinolaryngology-Head and Neck
Surgery, Soonchunhyang University College of
Medicine*
Jong Dae LEE

Vestibular schwannomas (VS) are the most common tumours of the cerebellopontine angle. Although VSs arise from the vestibular nerves, 95% of patients with VS present with sensorineural hearing loss (SNHL). The underlying pathophysiological mechanisms of this SNHL are currently unknown. Better understanding of the possible etiologies of hearing loss will help in guiding VS treatment choices on the basis of tumor size and location. The mechanical effect is thought to involve compression or stretching of the cochlear nerve or compromise of the vascular supply to the cochlea and neurotoxic injury caused either by alterations in the biochemical properties of the inner ear fluid or through accumulation of tumor toxic metabolites may be responsible for hearing loss of VS. We review some of these mechanisms with special emphasis on hearing loss associated with VS

» 09:10-09:30

» What strategy should we select for acoustic tumor in difficult case

*Dep. of Otolaryngology, Head and Neck Surgery,
Kitano Hosp., Tazuke Kofukai Medical Research
Institute*
Shin-ichi KANEMARU

There are many decision factors for the treatment of Acoustic tumor (AT). They are age of the patient, tumor size, main location of the tumor, growth ratio of the tumor, hearing level, with/without facial palsy, disorder of equilibrium, and other neurological involvements. There are several options of the treatment of AT but the leading treatment is thought to be surgery. There are three or four major operative methods: trans-labyrinthine approach, middle fossa approach, retro-sigmoid sub-occipital approach, and retro-labyrinthine approach. In addition to considering above decision factors, operator needs to select the operative method on the basis of anatomical features of each patient. Moreover, in recent years, it is required to preserve not only facial nerve function but also hearing ability as much as possible. Even in the case with scale out hearing level, preservation of cochlear nerve makes it possible to re-acquire hearing ability by cochlear implant. Therefore, we should select the operative method after a careful comparative review of each approach. And it must be remembered that we otolaryngologists should have good relationships with neurosurgeons. In this session, I will introduce our strategy for the AT operation in difficult case.

» 09:30-09:45

» Hearing restoration in neurofibromatosis type II

*Department of Otorhinolaryngology, Yonsei University
College of Medicine*
Jae Young CHOI

Most patients with neurofibromatosis type II (NF-II) will eventually encounter bilateral deafness, creating an obstacle to social life. In patients with NF-II, sound amplification with hearing aids does not provide an effective solution, as speech discrimination scores (SDSs) usually remain low in the presence of retrocochlear lesions. Certain NF-II patients with mild to moderate hearing loss might benefit slightly from the use of hearing aids; however, in most cases, their hearing loss is progressive and often inevitably exceeds a level that can be rehabilitated by hearing aids. In

the past, no effective methods for rehabilitating patients with severe to profound hearing loss existed; consequently, lip-reading and sign language have been the only means of communication. In 1979, House and Hitselberger successfully performed a single-channel auditory brainstem implant (ABI) for the hearing rehabilitation of a patient with NF-II. Subsequently, the principles and concepts of treatment for patients with severe to profound hearing loss have changed. Advancements in electronic and medical devices have provided satisfactory treatment results in patients with severe to profound hearing loss. Otolologists should be fully aware of the diverse indications and potential benefits of every possible hearing rehabilitation method in order to provide active support for patients with NF-II

» 09:45-10:00

» Hearing preservation surgery in intracanalicular vestibular schwannoma

*Department of Otorhinolaryngology-Head & Neck
Surgery*

Jong Woo CHUNG

Vestibular schwannomas(VS) are benign, generally slow-growing tumors that arise from the vestibular portion of the eighth cranial nerve. Despite the emergence of “wait-and-scan” management and stereotactic radiation, surgery remains an essential part of the treatment. While many approaches to the internal auditory canal and cerebellopontine angle have been described for VS, the retrosigmoid, translabyrinthine, and middle fossa approaches are the three most commonly used approaches for surgical resection. The surgical procedure can be decided according to the tumor size, preoperative hearing level, and facial function. The translabyrinthine approach is used for patients with non-serviceable hearing or in cases when hearing preservation is not feasible. It offers adequate exposure for the removal of large tumors and tumors extending into the fundus of the internal auditory

canal. However, this approach sacrifices residual hearing and requires a separate surgical site to harvest fat tissue for closure. The retrosigmoid approach provides a panoramic view of the posterior fossa for large tumors and the possibility of hearing preservation for a small tumor located in CPA. However, it can require prolonged cerebellar retraction and offers limited visualization of the internal auditory canal without intradural, transmeatal drilling. And the middle fossa approach(MFA) is reserved for small tumors confined to the internal auditory canal in patients with functional preoperative hearing. Some disadvantages of this approach include temporal lobe retraction and potentially a less favorable orientation of the intrameatal segment of the facial nerve for tumor dissection. Still, MFA is an excellent treatment option for intra-canalicular VS when surgical excision is needed.

» 10:00-10:15

» Neurological perspective of retrosigmoid approach in vestibular schwannoma

*Department of Otolaryngology-Head and Neck
Surgery, St Pauls Hospital, The Catholic University of
Korea*

Ki-Hong CHANG

There are three common surgical approaches in the treatment of vestibular schwannoma; translabyrinthine approach, middle fossa approach and retrosigmoid approach. Contrary to the translabyrinthine approach, hearing could be preserved with middle fossa approach and retrosigmoid approach. Otolologist tend to prefer the middle fossa approach rather than retrosigmoid approach because they are not familiar with intracranial anatomy. Retrosigmoid approach is the most favorable surgical approach used by neurosurgeons in most of posterior fossa meningioma, vestibular schwannoma, petroclival pathology, etc. Each approach has different surgical indications, advantages, and drawbacks. In general, it has been known that the hearing preservation rate is better with the middle

fossa approach than with retrosigmoid approach. On the contrary, postoperative facial nerve function is poorer with the middle fossa approach than with retrosigmoid approach. However, there is not a large difference between two approaches in small sized vestibular schwannomas. Main advantage of retrosigmoid approach is that it could apply to patients of vestibular schwannoma with serviceable hearing, irrespective of tumor size. I would like to present advantages and disadvantages of retrosigmoid approach in the treatment of vestibular schwannoma and discuss which approach is appropriate for focusing on the hearing preservation.

OTRT I

RM 4-1 (Convention A)

Chair : **Yang-Sun CHO**

**Chronic Recurrent Suppurative Otitis Media
After Surgical Management With or Without
Cholesteatoma: how I Do It?**

» **10:45-11:00**

» Using MRI for surveillance of recurrent cholesteatoma - can you avoid 2nd look surgery

Univ. of Texas Southwestern Medical Center, USA

Kenneth H. LEE

Cholesteatoma is a condition with risk of recurrence and residual disease after surgical treatment. Congenital cholesteatomas are aggressive in nature thus children overall have higher risks of residual disease. In addition, they have greater risk of recurrent disease due to ongoing Eustachian tube dysfunction. Historically, "second look" procedures were routinely performed and considered standard of care. Recently, definitive plans for revision tympanomastoidectomy procedures have become challenged due to concerns of repeated risks of anesthesia, surgery and added health care costs. While cholesteatoma is diagnosed primarily by clinical exam, imaging with

computed tomography has long been used as a tool to assist in confirming the diagnosis and determining the extent of the disease. In patients who have previously undergone primary cholesteatoma surgery, diffusion weighted magnetic resonance imaging (DW MRI) has become a useful imaging modality to differentiate the presence of cholesteatoma vs. mere fluid or inflammation in the middle ear and mastoid. At our center, we often use DW MRI in children for surveillance to evaluate for the presence of cholesteatoma. The results of these imaging studies in comparison to subsequent surgical findings will be presented to review the accuracy of DW MRI in identifying cholesteatoma in our pediatric patient population.

» **11:00-11:15**

» Endoscopic cartilage myringoplasty

Dep of ORL, Hosp Raja Permaisuri Bainun, Ipoh

Philip RAJAN

Endoscopic middle ear surgery has gained considerable interest among otorhinolaryngologists since the 1990's. A number of otologic surgical procedures, traditionally performed with a microscope have been successfully performed with an endoscope. These include surgery for cholesteatoma, chronic middle ear disease, otosclerosis and even cochlear implantation. This presentation highlights how the use of an endoscope has transformed the presenting authors' practice for myringoplasties which has led to a significant increase in success rates. The method of using a cartilage or composite perichondrial cartilage graft endoscopically is described and the success rates highlighted.

» 11:15-11:30

» Management recurrent of COM how i do it

Soekirman Soekin ENT HNS Proklamasi Hosp
Soekirman SOEKIN

Introduction Many challenges be founded on management of Chronic Otitis Media(COM) such as : the recurrency issue be related with cholesteatoma and non cholesteatoma, surgical technique, ear aeration system, bacterial infection, immunologic system etc **Objective :** To inform some experiences surgery on CWU or CWD tympanomastoidectomy To describe some technique closed technique tympanomastoidectomy CWD To describe using endoscopic ear surgery on surgery of COM **Method and Material** During 2010-2016 more than 751 ear surgery from my personal experience have been done at Proklamasi ENT HNS Hospital Jakarta, surgical technique will be discussed. The step ear surgery such as : planning, exploration, recognition, eradication, reconstruction and evaluation be done, the challenge on surgery will be described **Type of surgery** are CWU / CWD tympanomastoidectomy, myringoplasty, and tympanoplasty, which be done microscopic or endoscopic ear surgery Some a new technique for ear surgery will be described especially closed technique canal wall down tympanomastoidectomy Any revision surgery be done by endoscopic ear surgery **Result :** successfull rate for ear surgery 90-97 % **Conclusion :** Surgery of COM should have to have step planning, exploration, recognition, eradication, reconstruction and evaluation step. Surgery could be CWUor Closed technique CWD tympanomastoidectomy, Any revision surgery can be do Endoscopic Ear Surgery **Keyword :** CWU, Closed Technique CWD, Tympanomastoidectomy * Proklamasi ENT HNS Hospital Jakarta, Indonesia

» 11:30-11:45

» Mastoid obliteration in recurrent COM surgery

Korea University Guro Hospital
Sung Won CHAE

The aim of middle ear surgery is to restore a safe, dry and self-cleaning external auditory canal and to obtain a functional middle ear mechanics. After the concept of mastoid obliteration was first introduced in 1911 by Mosher, there have been reports detailing a variety of techniques of obliterating the mastoid cavity. Current trends prefer to use a combination of mastoid obliteration and reconstructive technique, with muscle flaps and bone chips over non-biologic materials such as hydroxyapatite crystal and ceramic. Most methods of mastoid obliteration appear to have a relatively favorable results. Several techniques for mastoid obliteration means there is no perfect solution. The ideal procedure should be simple and easy to do and comfortable to operator. And the procedure should be minimal complications including decreased risk of recurrent and other tissue damage. Available materials and technique for mastoid obliteration will be reviewed and how to make a decision of mastoid obliteration also discussed.

» 11:40~12:00

» Mastoidoplasty or subtotal petrosectomy:
Alternative option for hearing rehabilitation &
disease eradication

*Department of Otorhinolaryngology, College of
Medicein, The Catholic University of Korea*
Shi Nae PARK

Mastoidoplasty is a surgical technique which is a meticulous mastoid obliteration to achieve normal looking external auditory canal. It can be a good surgical option for not only elimination of the cavity problem, but also further hearing rehabilitation with canal type hearing aids in the patients

with huge mastoidectomized cavity. Especially for the patients with Eustachian tube dysfunction and recurrent cholesteatoma after canal wall down mastoidectomy, mastoidoplasty can be considered as a sole surgical technique or combined with a revisional canal wall down mastoidectomy. Reconstruction of the mastoidectomized cavity by inferior based periosteal flap, anterior based temporalis rotational flap and/or artificial bone to make a normal looking external auditory canal is a basic concept of mastoidoplasty. Surgical technique and the overall surgical results will be introduced. Another surgical technique of subtotal petrosectomy for disease eradication in chronic otitis media will be mentioned. Thirty-four patients who received subtotal petrosectomy by one surgeon between April 2004 and Aug 2017 were reviewed. Twelve patients underwent simultaneous or sequential CI for hearing rehabilitation depending on the active infectious condition of their middle ear. Analytic data of subtotal petrosectomy showed the improved postoperative quality of life and the highly satisfied status from therapeutic and cosmetic viewpoints. Recurrence of otitis media or other major complications were not observed during a long-term follow up period. We propose that mastoidoplasty or subtotal petrosectomy is a recommendable surgical modality for both disease eradication and hearing rehabilitation in patients with chronic otitis media, when indicated.

OTSP V

RM 4-1 (Convention A)

Chair : Eui Kyung GOH, Gyu-Cheol HAN

**BPPV: from Basic to Evidence-Based
Clinical Approach**

» **13:30-13:50**

» **Animal study for the pathological mechanism of BPPV**

Tokyo Medical University

Mamoru SUZUKI

The mechanism of BPPV was studied by using the isolated vestibular organ of the bullfrog. The saccular otoconia were placed on the cupular surface to mimic the condition of cupulolithiasis. The otoconia were inserted in the semicircular canal (SC) to mimic canalolithiasis. Both cupulolithiasis and canalolithiasis changed the ampullary nerve action potential (AP) when position of the preparation was changed. The canalolithiasis showed a latent period and short duration of AP, which is comparable to the clinical features of BPPV. The AP to sinusoidal rotatory stimuli was examined in normal, canalolithiasis and cupulolithiasis models. Large and small mass of the otoconia was used for the models. The large otoconia markedly decreased the AP, particularly in the cupulolithiasis model. This is possible mechanism of reduced caloric response and VOR gain in BPPV. The otoconial mass placed within the SC was returned to the utricular macula in order to observe its behavior. Immediately after the return, the mass was unstable and moved around when the preparation was tilted. This is possibly a mechanism of temporary dizziness after physical therapy. However, the mass became stabilized in short period, indicating long time body restriction won't be necessary after maneuver. ER α and β in the vestibular organs of the male and female mice with young and old age were studied by immunostaining method. The ER activity decreased in the older animals, indicating that decreased

estrogen is responsible for otoconial disturbance and emergence of BPPV.

» 13:50-14:05

» Evidence for the diagnosis of benign paroxysmal positional vertigo

Department of Otolaryngology-Head and Neck Surgery, Kangbuk Samsung Hospital, Sungkyunkwan University School of Medicine

Min-Beom KIM

The diagnosis of BPPV is established by a history of episodic vertigo with changes in head position and the presence of characteristic nystagmus provoked by the Dix-Hallpike test or supine roll test. The Dix-Hallpike test is generally considered the gold standard test for the diagnosis of posterior canal BPPV in that it is the most common diagnostic criterion required for entry into clinical trials and for inclusion of such trials in meta-analyses. The Dix-Hallpike test is not truly 100% sensitive, however, since BPPV is an intermittent condition and variations in examiners' technique and experience might affect the test outcome. The sensitivity of the Dix-Hallpike test has been estimated at 48 to 88% according to a structured review of published literature. The same review found that estimates for specificity is lacking. In the primary care setting, the Dix-Hallpike test reportedly has a negative predictive value of 52% for the diagnosis of BPPV. Given the above considerations, the Dix-Hallpike test should be routinely performed if possible in the evaluation of vertigo/dizziness. Whereas a positive test should be considered sufficient for the diagnosis of BPPV in the clinical setting, a negative test should not rule out BPPV completely. The supine roll test is performed by rotating the patient's head from neutral to one side while the patient is lying supine. For geotropic nystagmus the side associated with the stronger nystagmus is likely the affected ear. For apogeotropic nystagmus the side associated with the weaker nystagmus is the likely the affected ear. Geotropic nystagmus is more common and

suggests that the canaliths are located in the long arm of the lateral canal far from the cupula. Apogeotropic nystagmus is less common and suggests that the canaliths are located very close to the cupula or possibly embedded in it. In a review of 9 series with a total of 257 patients with lateral canal BPPV geotropic nystagmus accounts for about 70% of the cases and apogeotropic nystagmus accounts for about 30% of the cases. The supine roll test is the most commonly accepted criterion for the diagnosis of lateral canal BPPV in clinical trials. There is no literature on the sensitivity or specificity of this test in the diagnosis of lateral canal BPPV partly because clinical history alone is often not sufficient for diagnosis and there is no other gold-standard test to which the supine roll test can be compared. In this session, I'd like to talk about the evidence for the diagnosis of BPPV with literature review.

» 14:05-14:20

» Evidence for the efficacy of reposition maneuvers for posterior canal BPPV

Department of Otolaryngology-HNS, The Catholic University of Korea
Eun-Ju JEON

BPPV, especially occurring in the posterior canal, is most common cause of vertigo. The prognosis is usually good, but the vertigo is so intense and restricts patient's activities. Canalith repositioning procedures (CRPs) has been used to treat BPPV through sequential head and body position changes designed to relocate dislodged particles within the inner ear. There has been much high-quality evidences that CRP for posterior semicircular canal BPPV is effective. 2017 update of a guideline from AAO-HNSF strongly recommended that clinicians should treat patients with posterior canal BPPV with a CRP. Two types of CRP are used for posterior canal BPPV: (1) Epley maneuver (EM) and (2) Semont maneuver (SM). 2010 meta-analysis of CRP found that patients treated with EM had a 6.5-times greater chance of improvement in clinical symptoms

relative to controls (OR, 6.52; 95% CI, 4.17- 10.20) and similar likelihood of negative Dix-Hallpike maneuver (OR, 5.19; 95% CI, 2.41-11.17). The 2014 updated Cochrane reported that CRP is more effective when compared with sham maneuvers or controls. Complete resolution of vertigo occurred significantly more often in the CRP treatment group when compared with sham or control (OR, 4.42; 95% CI, 2.62-7.44). A single CRP is >10 times more effective than a week of 3-times-daily Brandt-Daroff habituation exercises (OR, 12.38; 95% CI, 4.32-35.47). For follow- up period of 12 months, the efficacy of EM was kept superior to sham procedure. Treatment success were kept in 91% of EM group, whereas sham group showed 46% success rate ($P = 0.001$) at 12 month follow up. The DHI was significantly lower in EM group for 12 months follow up period ($P = 0.003$). When comparing the effectiveness of SM with EM, Cochrane review showed no difference. In a double-blind randomized trial, negative Dix-Hallpike was found on 4th day after treatment in 85% of patients in SM group versus 14% in control group ($P = .001$). There is sufficient evidence that the EM is a safe, effective treatment for posterior canal BPPV, based on the results of high quality, randomized controlled studies. Outcomes for EM are comparable to treatment with SM, but superior to Brandt-Daroff exercises.

» 14:20-14:35

» Evidence for the efficacy of reposition maneuvers for horizontal canal BPPV

*Department of Otorhinolaryngology, Yonsei University
College of Medicine*
Sung Huhn KIM

Horizontal canal BPPV shows two types of nystagmus evoked by supine head roll test; one is geotropic horizontal nystagmus which means the direction of evoked-nystagmus towards upward to earth-horizontal plane, and the other is apogeotropic horizontal nystagmus which means the direction of nystagmus towards downward to earth-

horizontal plane. Several treatment repositioning maneuvers for horizontal canal BPPV have been suggested, such as Lempert maneuver, Gufoni maneuver, and cupulolith repositioning maneuver, and the maneuvers have been modified according to the type of evoked-nystagmus. However, direct evidences for the efficacy of reposition maneuvers for horizontal canal BPPV were lacking if compared to that for posterior canal BPPV until 2008 at which clinical practice guideline for BPPV was published by American Academy of Otolaryngology Head and Neck Surgery and American Academy of Neurology; evidences for the treatment effect of reposition maneuvers for BPPV were mainly limited in the posterior canal BPPV. After the year of 2008, many prospective randomized controlled studies for the treatment effect of reposition maneuvers on horizontal canal have been performed and published. The results of those studies were pretty promising. Therefore, I'd like to summarize the results of treatment efficacy of various reposition maneuvers for horizontal canal BPPV in the recent literatures in which prospective randomized controlled study was performed, discuss about the results, and suggest future direction for further study.

» 14:35-14:50

» Natural course of BPPV

*Department of ORL-HNS, Coll. of Medicine, Dankook
University*
Jae Yun JUNG

Patients with benign paroxysmal positional vertigo (BPPV) complain of brief rotational vertigo induced by a change of head position with respect to gravity accompanied with characteristic nystagmus depending on the involved semicircular canal. In many cases, making a proper diagnosis is not difficult for the experienced clinicians. Upon diagnosing of various type of BPPV, specialized maneuvers are performed to treat BPPV and overall success rate is quite high. That is why we use the word "benign" to describe this disease. There have been several researches

regarding the fate of positional vertigo and nystagmus when observed without treatment in patients with posterior BPPV and horizontal BPPV. But our understanding of the pathophysiology of BPPV and the mechanism how this disease is cured is still incomplete. In this presentation, review of natural course of BPPV and current knowledges to help understanding the fate of dislodged otoconia debris in the semicircular canal will be discussed.

OTSP VI

RM 4-1 (Convention A)

Chair : Won-Ho CHUNG, Hyung Jong KIM

**The Inner Ear Imaging:
from Animal to Human Application**

» 15:20-15:40

» Imaging and classification of endolymphatic hydrops

*Department of Otorhinolaryngology, Nagoya
University, Nagoya, Japan*

Tadao YOSHIDA

A characteristic pathological finding in Meniere's disease (MD) is well known as endolymphatic hydrops (EH). EH should be one of the causes or results of MD. In this talk, I would like to describe the EH with hearing assessment, contralateral ear and healthy subjects. The diagnostic criteria for MD defined by the American Academy of Otolaryngology-Head and Neck Surgery (AAOHNs) in 1995, which have been used worldwide for the past 20 years, classify MD into four different subtypes: certain, definite, probable, and possible MD. The diagnosis of certain MD requires the confirmation of EH by histopathological assessment of the temporal bone after death. Given the relationship between EH and MD, the functional and morphological diagnosis of EH has

improved considerably with the development of MRI of the inner ear, although this technique is not widely used in clinical practice at present. The 2015 criteria only include definite MD and probable MD and do not require the confirmation of EH. However, possible MD or borderline MD should be investigated to understand the overall features of MD with evaluation of the presence or absence of EH. In Japan, we have new diagnostic criteria by Japan society for Equilibrium research in 2016. This new criteria include EH with MRI study to diagnose as certain or definite MD. In our study, all patients with unilateral and bilateral MD showed significant or mild EH in the cochlea or the vestibule of the affected side. In most patients, the clinical symptoms of MD present after considerable accumulation of endolymph has occurred. However, some patients develop symptoms in the early stages of EH. Recently EH has been reported in some normal controls. The prevalence of asymptomatic EH may be much higher than that of MD in the population. Imaging evaluation improves our understanding of EH and MD.

» 15:40-15:55

» Role of inner ear MR imaging in Meniere's disease

*Department of Otorhinolaryngology-Head and
Neck Surgery, Sungkyunkwan University School of
Medicine, Samsung Medical Center*

Won-Ho CHUNG

Introduction. Ménière's disease(MD) is a multifactorial disorder in which typical symptoms are recurrent episodes of vertigo, fluctuating hearing loss, tinnitus, and ear fullness. Endolymphatic hydrops(EH) is the histological hallmark of MD, which is over- accumulation of endolymph in the cochlear and the vestibular endolymphatic space. With introduction of MRI technique, it has become possible to visualize the endolymphatic hydrops in the living patients. Methods. We performed inner ear MRI following 4 hours after intravenous administration of single-dose gadolinium-

based contrast media to visualize endolymphatic hydrops. Using this technique, we investigated the following issues. 1. Diagnostic value of IV-Gd enhanced inner ear MRI in MD 2. Correlation with audio-vestibular test results 3. Follow-up imaging & Natural course of endolymphatic hydrops 4. Differential diagnosis with non-MD disease Results. 1. The hydrops ratio in the cochlea and vestibule were significantly higher in the affected side than the unaffected side. The mean ratios of hydrops in cochlea were 0.372 for the affected ear and 0.214 for the unaffected ear ($p < 0.01$). Similarly, the mean ratios of hydrops in vestibule were 0.667 for affected ear and 0.266 for the unaffected ear ($p < 0.01$). 2. Average pure-tone thresholds for 0.5, 1k, 2k, and 4k Hz was significantly correlated with cochlear and vestibular hydrops ($p < 0.01$) in the affected side. When comparing SP/AP ratio of EcoG with hydrops ratio in the vestibule showed significant ($P < 0.05$) difference in the affected ear. Similarly, the results caloric test also showed a significant correlation ($P < 0.05$) with relative vestibular hydrops ratio ($\%RVH = [\%VH \text{ affected ear} - \%VH \text{ unaffected ear}] / [\%VH \text{ affected ear} + \%VH \text{ unaffected ear}]$). In results of VEMP, the subjects with IAD greater than 25% tended to have higher hydrops ratio in cochlea and vestibule. However, it was not statistically significant. 3. The endolymphatic hydrops level has increased over time in the patients with MD despite the controlled vertigo spell. These indicated that the endolymphatic hydrops may be irreversible and progressive phenomenon in MD. 4. IV-Gd inner ear MRI can be helpful for differential diagnosis of Meniere's disease

» 15:55-16:10

» Inner ear MRI lesson from animal study

*Department of Otorhinolaryngology, Seoul National
University Hospital
Myung-Whan SUH*

PURPOSE: To compare the inner ear enhancement after intratympanic injection of two widely used gadolinium

(Gd) agents by 9.4 T micro-magnetic resonance imaging (MRI) and to investigate the effects of Gd on the inner ear. METHODS: Twelve ears of six rats received intratympanic administration of 1/5 diluted Gd agents: gadoterate meglumine (Gd-DTPA) for the left ear and gadodiamide (Gd-DTPA-BMA) for the right ear. MRI was performed every 30 min from 1 to 4 h after administration. The normalized signal intensity was evaluated by quantitative analysis at each cochlear fluid compartment. Eight, six, and seven ears treated with Gd-DTPA, Gd-DTPA-BMA, and nothing as controls, respectively, were processed for histological evaluation after MRI. After hematoxylin & eosin staining, adverse inflammatory reactions were evaluated for turbid aggregation and lymphocytes. RESULTS: The perilymphatic enhancement of Gd-DTPA was superior to that of Gd-DTPA-BMA regardless of cochlear turn, compartment, and time point. Inflammatory reactions were found in 4/8 (50.0%) and 4/6 (66.6%) ears administered Gd-DTPA and Gd-DTPA-BMA, respectively. Regardless of the contrast agent used, inflammatory reactions were most definite in the scala tympani of the basal turn, i.e., near the round window. Slightly greater inflammatory reactions were observed in ears injected with Gd-DTPA-BMA compared to Gd-DTPA although the difference was not statistically significant. No inflammatory reaction was observed in any of the seven controls. The auditory brainstem response threshold was 11.8 ± 2.5 dB SPL before IT Gd injection and it did not change for up to 5 days (15.4 ± 6.6 dB SPL) post-injection. CONCLUSIONS: Gd-DTPA was superior to Gd-DTPA-BMA for visualization of the inner ear. Administration of diluted Gd agents intratympanically may induce considerable inflammatory reactions in the inner ear.

» 16:10-16:25

» Application of optical coherence tomography in the inner ear imaging

*Department of Otorhinolaryngology, Ajou University
School of Medicine*

Jeong Hun JANG

Optical coherence tomography (OCT) is a real-time optical imaging method that non-invasively acquires detailed images of in vivo tissues based on optical interference. It is non-destructive and harmless because it uses low-power and a broadband near-infrared light source. The high-resolution tomographic images acquired with OCT cannot be obtained with traditional tomography equipment. The technique has been used mainly in ophthalmology and dermatology because of the easy application of OCT systems without additional devices such as scanners and endoscopes. Recently, the applicability of OCT systems in otology has also been reported. Herein, we introduce the current status of application of OCT in the inner ear imaging.

» 16:25-16:40

» Usefulness of intravital multiphoton microscopy in visualizing study of mouse cochlea and volume changes in the scala media

Yonsei University Wonju College of Medicine

Young Joon SEO

The visualization of scala media is an important study theme to otologist. We have tried many methods to reveal the space of scala media with microscopy. Conventional microscopy has limitations in viewing the cochlear microstructures due to three-dimensional spiral structure and the overlying bone. But these issues can be overcome by imaging the cochlea in vitro with intravital multiphoton microscopy (MPM). By using near-infrared lasers for multiphoton excitation, intravital MPM can detect endogenous fluorescence and second harmonic generation of tissues. In this study, we used intravital MPM to visualize various cochlear microstructures without any staining and non-invasively analyze the volume changes of the scala media (SM) without removing the overlying cochlear bone. The intravital MPM images revealed various tissue types,

ranging from thin membranes to dense bone, as well as the spiral ganglion beneath the cochlear bone. The two-dimensional, cross-sectional, and serial z-stack intravital MPM images also revealed the spatial dilation of the SM in the temporal bone of pendrin-deficient mice. These findings suggest that intravital MPM might serve as a new method for obtaining microanatomical information regarding the cochlea, similar to standard histopathological analyses in the animal study for the cochlea. Given the capability of intravital MPM for detecting an increase in the volume of the SM in pendrin-deficient mice, it might be a promising new tool for assessing the pathophysiology of hearing loss in the future.

OTOP VIII

RM 4-1 (Convention A)

Chair : Shi Nae PARK, Jae Jun SONG

Basic II

» OTOP-41 08:00~08:10

» The biphasic effects of placental derived mesenchymal stem cells on cisplatin exposed HEI-OC1

Bundang CHA Medical Center

**So Young KIM, Tae Hyun SHIN, Cheongse WON,
Mi Kyung KIM, Hyoung-Mi KIM, Chang Ho LEE**

Objectives:The aim of the present study was to exam the effects of placental derived mesenchymal stem cells (PL-MSCs) on the HEI-OC1 which was exposed to different concentration of cisplatin.

Methods:In the first experiment, the HEI-OC1 was exposed to 50 uM cisplatin for 24 hours. Then the cisplatin exposed HEI-OC1s were co-cultured with PL-MSCs for 1 day. In the second experiment, the HEI-OC1 was exposed to 10 uM cisplatin for 24 hours. Then the cisplatin exposed HEI-OC1s were co-cultured with PL-MSCs for 3 days. The oxidative stress markers of SOD2, HO-1, XBP1S and BiP and inflammation markers of TNF- α and IL-6 expressions were investigated using RT-PCR. The caspase 3, cleaved caspase 3, PARP, and cleaved PARP levels were explored using western blot. The differences of expression levels between mono-cultured and co-cultured cisplatin exposed HEI-OC1s were analyzed using Mann-Whitney U tests.

Results:Both 10 uM and 50 uM cisplatin exposed HEI-OC1s showed increased expressions of the oxidative stress markers of SOD2, HO-1, XBP1S and BiP and inflammation markers of TNF- α and IL-6. In the first experiment, the expression levels of SOD2, HO-1, XBP1S and BiP were increased in PL-MSC co-cultured group

than mono-cultured group. In the second experiment, the SOD2, HO-1, XBP1S and BiP expressions were decreased in PL-MSC co-cultured group than mono-cultured group. The caspase 3, cleaved caspase 3, PARP, and cleaved PARP levels did not significant difference between mono-cultured and co-cultured groups.

Conclusions:The PL-MSCs aggravate the oxidative stress of cisplatin exposed HEI-OC1 in high concentration of 50 uM cisplatin. On the other hands, the oxidative stress of as low as 10 uM cisplatin exposed HEI-OC1 was decreased after co-culture with PL-MSCs. The apoptosis pathway did not show significant difference after co-culture with PL-MSCs.

» OTOP-42 08:10~08:20

» Identification of the first OTOA variants in Koreans and elucidation of underlying molecular mechanism of moderate to severe hearing loss related to OTOA variants

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**Bong Jik KIM¹, Dong-Kyu KIM², Jin Hee HAN³,
Hye-Rim PARK³, Ah-Reum KIM³, Min Young KIM³, Woong-Yang PARK⁴, Seungmin LEE³, Doo Yi OH³, Sungjin PARK², Byung Yoon CHOI³**

Objectives:OTOA encodes otoancorin, which is required for limbal attachment of the tectorial membrane, thus assumed to play a crucial role in stimulating inner hair cells. Since the first identification of OTOA as a cause of deafness (DFNB22), no convincing variant of this gene has been reported in Koreans. Further, the exact molecular mechanism of DFNB22 have not well been elucidated yet. This study aimed to report novel variants of OTOA

underlying DFNB22 in Koreans and address the molecular mechanisms associated with SNHL.

Methods: A 21-month-old boy who had failed Newborn Hearing Screening visited our clinic. His pedigree showed an AR inheritance pattern and his audiogram demonstrated a moderate degree SNHL. For genetic diagnosis, screening of 11 common variants was performed, followed by WES. Bioinformatic filterings were done to narrow down the candidates. Then the final candidate variants were validated by in vitro studies: minigene splicing assay, N-terminal surface staining and western blots.

Results: Genetic study of proband identified two novel OTOA variants: a frameshift variant (c.1765delC: p.Q589Rfs*55) which truncates the protein at the most upstream residue thus far reported and a splice site variant (c.1320+5G>C) in a trans configuration. Minigene splicing assay revealed that our splice site variant critically affected the canonical splicing donor site. Further, we elucidated that a mutant protein (OtoaQ589Rfs*55) supposedly lacking significant amount of C-terminal parts, displayed failure in glycosylphosphatidylinositol (GPI)-anchorage and showed uncontrolled constitutive secretion, unlike OtoaWT which is tethered to the plasma membrane through GPI-anchorage.

Conclusions: Here, we report two novel variants of OTOA causing DFNB22 first time in Koreans, and our results suggest that failure in GPI- anchorage and resultant uncontrolled constitutive secretion might play a crucial role in the pathogenesis of SNHL, providing an important step toward understanding the molecular mechanisms of DFNB22.

» **OTOP-43 08:20~08:30**

» The effect of propofol infusion with topical epinephrine on cochlear blood flow and hearing: An experimental study

*Department of Otolaryngology, Chonnam National
University Medical School*

Hee Young KIM, Chul Ho JANG, Tae Gu KANG,

Young Yoon KIM, Yong Beom CHO

Objectives: Propofol is the most commonly used intravenous (IV) anesthetic agent and is associated with hypotension upon induction of anesthesia. Intravenous propofol infusion has several properties that may be beneficial to patients undergoing middle ear surgery. Topical application of concentrated epinephrine is a valuable tool for achieving hemostasis in the middle ear and during mastoid surgery. The purpose of the present study was to determine the effects of propofol infusion with topical epinephrine on cochlear blood flow (CBF) and hearing in rats.

Methods: Twenty one male Sprague-Dawley rats were divided into three groups. The rate of intravenous infusion of propofol was 4-6 ml/kg/hour. The first group (control group, n = 7) was given IV infusion of phosphate buffered saline (PBS) with topical application of PBS in the round window. In study group A (n = 7), the effect of topical phosphate buffered saline with IV infusion of propofol on CBF and hearing was evaluated. In study group B (n = 7), additional effects of topical epinephrine with IV infusion of propofol on CBF and hearing were evaluated. The laser Doppler blood flowmeter, CBF, and the mean arterial blood pressure (MAP) were measured and analyzed. Additionally, hearing test using auditory brainstem response (ABR) was performed in both groups.

Results: In both groups, infusion of propofol induced a time-dependent decrease in MAP. Approximately 30 min after the start of the propofol infusion, the CBF started to decrease slowly. The decrease in CBF was significantly greater in the study group compared to the control group. The threshold was elevated in the study group relative to the control group.

Conclusions: During middle ear surgery, use of IV infusion of propofol with topical epinephrine cotton ball or cottonoid application is not recommended.

» **OTOP-44 08:30~08:40**

» Rescue of misfolded pendrin by regulation of DNAJC14 chaperonin

*Department of Otorhinolaryngology, Yonsei University
College of Medicine*

Hye Ji CHOI, Jae Young CHOI, Jinsei JUNG

Objectives: p.H723R(His 723Arg) is the most prevalent mutation in East Asia, which result in misfolding and leads to defects cell surface expression. In the present study, we attempted to rescue p.H723R-pendrin trafficking by the activation of DNAJC14 through Flavivirus injection or overexpression of DNAJC14.

Methods: To identify the correction of misfolded pendrin via the activation DNAJC14 by Flavivirus, we performed surface biotinylation assay, immunocytochemistry and measured anion exchange activity after treatment of Japanese encephalitis virus (JEV) or its low attenuated vaccine. To verify the possibility of rescue of p.H723R pendrin, overexpression of DNAJC14 in p.H723R human pendrin transgenic mouse with knockout background of mouse pendrin was established. In this mouse model, auditory brainstem response (ABR), western blot, immunohistochemistry, and whole mounting of hair cells were performed.

Results: In vitro surface biotinylation assay, we confirmed p.H723R-pendrin increased at cell surface after treatment of JEV. Surface form of p.H723R-pendrin increased at 105 PFU titer of JEV. In immunocytochemistry, p.H723R-pendrin treated JEV also increased at cellular surface. Notably, anion (Cl^-/HCO^-) exchange activity was also significantly increased in p.H723R-pendrin treated with JEV. In DNAJC14 overexpressed transgenic mice model, threshold of auditory brainstem response was not recovered. Nevertheless, stria vascularis depth was slightly widened and outer hair cells were quite well survived and expression of KCNJ10 was significantly increased, implying that endocochlear potential may be partially rescued.

Conclusions: Overexpression of DNAJC14 mouse

ameliorated the pathogenesis caused by p.H723R misfolded pendrin regarding to increased surface expression of pendrin, widening of stria vascularis, conserved KCNJ10 expression in the stria vascularis, and preservation of cochlear hair cells.

» **OTOP-45 08:40~08:50**

» Expression of C-type lectin receptor mRNA in otitis media with effusion and chronic otitis media with and without cholesteatoma

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Jeon-Gang DOO¹, Young-Il KIM², Sung-Hwa DONG¹, Jae-Yong BYUN³, Moon-Suh PARK³, Sang-Hoon KIM¹, Seung-Geun YEO^{1,2}

Objectives: C-type lectin receptors (CLRs) are a family of pattern recognition receptors (PRPs). The expression of CLRs has been analyzed in other diseases but has not yet been compared in patients with otitis media with effusion (OME), chronic otitis media (COM) and COM with cholesteatoma (Chole OM). This study therefore evaluated the levels of expression of mRNAs encoding Dectin-1, MR1, MR2, DC-SIGN, Syk, Card-9, Bcl-10, Malt-1, Src, DEC-205, Tim-3, Trem-1, and DAP-12 in patients with OME, COM, and Chole OM.

Methods: CLRs mRNA levels in patients with OME, COM, and Chole OM were assessed by real-time polymerase chain reaction. The level of expression of each mRNA was compared in patients with and without bacteria, and in patients with conductive hearing loss (CHL) and sensorineural hearing loss (SNHL).

Results: The patterns of expression of CLRs differed in patients with OME, COM, and Chole OM. Galectin-1 mRNA level was significantly higher in the COM than in

the Chole OM group ($p<0.05$), and MR1 and Galectin-1 mRNA levels among patients with CHL were significantly higher in those with COM than with Chole OM ($p<0.05$). Galectin-1 mRNA level among patients with SNHL was also significantly higher in the COM than in the Chole OM group ($p<0.05$).

Conclusions: The levels of expression of mRNAs encoding the CLRs Dectin-1, MR1, MR2, DC-SIGN, Syk, Card-9, Bcl-10, Malt-1, Src, DEC-205, Tim-3, Trem-1 and DAP-12 differ among patients with OME, COM, and Chole OM.

OTOP IX

RM 2-1 (Flamingo)

Chair : Joong Ho AHN, Dong Hee LEE

Inner Ear II

» OTOP-46 08:00~08:10

» Clinical application of 3D-FLAIR(fluid attenuated inversion recovery) MRI in patients with Menieres disease

Department of Otorhinolaryngology, head and neck surgery, University of Ulsan College of Medicine, Asan Medical Center

Yong-han KIM, Joong Ho AHN

Objectives:Meniere's disease is pathologically regarded as a result of fluctuation and rupture of endolymphatic hydrops within inner ear. But in usual clinical circumstances, the presence of endolymphatic hydrops was hard to be proven due to absence of appropriate test. The purpose of this study is to evaluate the clinical usefulness of 3D-FLAIR MRI for diagnosis of Meniere's disease and relationship between other laboratory test and hydrops in 3D-FLAIR MRI.

Methods:Comparative study was conducted on patients

with definite diagnosis of Meniere's disease visiting clinics from January to October 2015. 3D-FLAIR MRI, pure tone audiometry, electrocochleogram, VEMP, caloric test, rotatory chair test, sensory organization test, head impulse test and Korean functional level scale were measured.

Results:A total of 15 patients were enrolled in the study. 13 patients (86.7%) were proved to have endolymphatic hydrops with 3D-Flair MRI. Endolymphatic hydrops was found in 25% of unaffected ears and 88% of affected ears. Presence of endolymphatic hydrops was associated subjective symptoms, such as hearing loss, tinnitus, ear fullness and pure tone audiometry. ($P=0.05$)

Conclusions:3D-FLAIR MRI was a useful tool for detecting endolymphatic hydrops. But unclear pathogenesis of Meniere's disease and hydrops should be revealed for further evaluation.

» OTOP-47 08:10~08:20

» Asymmetric hearing loss and associated comorbidities in elderly people

Department of Otorhinolaryngology, CHA Bundang Medical Center, CHA University

Cheong Se WON, So young KIM, Chang Ho LEE, Hyoung-Mi KIM

Objectives:Recently the studies have explored the relationship between age-related bilateral hearing loss with disabling comorbidities, such as cognitive decline, Alzheimer's disease, balance problem and clinical depression. To address the needs of the growing elderly population, a better understanding of the characteristics of the hearing loss is needed. In the present study, we investigated whether the asymmetric hearing loss in elderly patients is also associated with the psychosocial comorbidities.

Methods:All patients aged >65 years were recruited at the time of audiologic testing. Audiometric data for each ear including air and bone conduction threshold, speech reception threshold (SRT), and word recognition score were

obtained. Also, the presence of retrocochlear pathology on previous imaging was recorded. Age, sex, general health and socioeconomic status were controlled for as potential confounders.

Results: During the study period, 56 individuals with asymmetric hearing loss between the ages of 65 and 98 years were identified. None demonstrated cochlear or retrocochlear pathology. Faster decrease in SRT and word recognition in poorer ear seem to be associated with more increase in cognitive deficit and the risk of depression. Adjusting for demographic, cardiovascular, and vestibular balance function did not substantially change the magnitude or significance of this association. Hearing aid use was associated with better cognition, independently of social isolation and depression.

Conclusions: The present study demonstrates associations between asymmetric hearing loss and specific chronic conditions, as well as the potential positive impact of audiological rehabilitation. An improved understanding of the prevalence, degree, and impact of hearing impairment in senior population will allow us to better address the psychoaudiological disabilities and effective evidence-based interventions.

» **OTOP-48 08:20~08:30**

» Comparison of the results between the first treatment group and the retreat group in sudden sensory hearing loss

*Department of otorhinolaryngology, Kosin University
College of Medicine*

Jae-Beom KO, Jae-Hwan KWON

Objectives: 돌발성 난청에서 환자들은 1차 의료 기관을 거치고 호전이 되면 치료를 중단하는데 호전이 없거나 정도가 심한 경우 상급의료 기관으로 오게 된다. 그동안의 연구에서 치료 성적 평가를 할 때 초치료군과 재치료군이 섞여서 평가되는 경우가 많아 실제 치료 효과에 대해 저평가 되는 경우가 많다고 사료되어 본 연구에서는 둘을 나누어 비교를 하고자 한다.

Methods: 2015년 1월부터 2017년 8월까지 본원 이비인후과에서

돌발성 난청으로 진단받고 입원치료를 받은 179명의 환자들의 의무기록을 후향적으로 분석. 환자를 초치료 군과 재치료군으로 나누었고 각각 30명 66명으로 나누어졌다. 모든 환자에게 동일한 치료를 시행하였다. 치료 효과를 평가하기 위해 순음청력검사를 통해 비교하였다.

Results: 본원에서 첫 치료 군 약 30명 중 호전된 경우 약 66% 현재까지 산정한 데이터로는 재치료군 66 중 호전된 경우 33% 정도.(구체적 데이터 비교는 추후 산정예정입니다.)

Conclusions: 기존에 발표된 치료 방법에 따른 성적에 대해서 평가를 할 때 실제로는 초치료군에 적용이 되어야하며 그 결과는 발표된 것 보다 더 높을 것이라고 판단이 된다. 이에 적극적으로 돌발성 난청에 대한 치료를 권유해야 한다.

» **OTOP-49 08:30~08:40**

» Prevalence of cochlear dead regions in hearing impaired adults with diverse aetiology

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Objectives: Cochlear dead region (CDR) is especially characterized by inner haircell (IHC) nonfunctioning or poor functioning in a certain cochlear region. It is hypothesized that if the amount of damage to IHCs/neurons is affected by etiologies of hearing loss, prevalence of the dead region would also be different. The aim of this study is to estimate the prevalence of CDR in different clinical populations

Methods: 627 ears of 437 subjects with sensorineural hearing loss (SNHL) were examined in this study. Individuals were classified into six groups based on the diagnosis of the hearing loss; (A) sudden: 176 ears, (B)

acoustic tumor: 42 ears, (C) Meniere's disease, MD: 73 ears, (D) presbycusis: 139 ears, (E) noise induced hearing loss, NIHL: 81 ears, (F) Unknown: 116 ears. The presence of CDR would be estimated by administrating the Threshold Equalizing Noise (TEN) test.

Results: The prevalence of CDR resulted in the following descending order: acoustic tumor (46.3%), sudden SNHL (25.7%), unknown (22.6%), NIHL (17.1%), MD (15.1%), and presbycusis (14.0%). The differences between the masked thresholds obtained by the TEN test and the TEN level are significantly correlated with the individual hearing thresholds at each test frequency.

Conclusions: The acoustic tumor group had a high prevalence of CDR while the presbycusis and MD group had a low prevalence. Although it showed a tendency for participants with higher hearing thresholds to likely have CDRs, thresholds on the audiogram are not enough to indicate the existence of CDR.

» **OTOP-50 08:40~08:50**

» The change of hearing and positional nystagmus after surgery in barotraumatic PLF

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Jungmin AHN, Se Eun SON, Won-Ho CHUNG

Objectives: The purpose of this study was to evaluate changes in hearing and nystagmus after surgical repair of the barotraumatic perilymph fistula (PLF).

Methods: Among forty-four patients who underwent surgical repair by the clinical suspicion of barotraumatic PLF, twenty-seven patients had Video-nystagmography(VNG) recording were enrolled. The hearing results and nystagmus were analyzed preoperatively, at 1 week and 1 month postoperatively.

Results: Hearing was improved in 20 (74.1%) out of 27 patients when hearing improvement defined as postoperative 4-frequency pure tone average (0.5, 1k, 2k,

and 4kHz) of bone conduction ≤ 25 dB or hearing gain ≥ 15 dB. Preoperative hearing thresholds were 81.67 ± 23.91 dB and postoperative hearing level was 49.91 ± 28.21 dB. Twenty-five out of 27 patients had nystagmus identified by VNG, of which 36% (n=9) had spontaneous nystagmus (SN) and 100% (n=25) had positional nystagmus. Within a week after surgical repair, SN was persistent in four patients (44.4%), and it was resolved in three of them at 1 month postoperatively. In addition, positional nystagmus was observed in 10 patients (40.0%) one week after surgery and persisted in 7 patients one month later. Dizziness and nystagmus was completely improved in 22 patients, however, three subjects who had recurred dizziness with positional nystagmus underwent revision PLF repair. Pattern of positional nystagmus was multi-directional or directional changing, and sustained longer in duration with slower velocity without reversibility. Also, there was a tendency of no improvement by the otolith repositioning maneuver.

Conclusions: Patients suspicious on barotraumatic PLF showed improvement in hearing and vertigo by surgical repair. However, the positional nystagmus can continue for a while after surgical repair. It could also recur after complete remission. Therefore, it might conclude that the hearing loss was related directly to perilymph leak, but the positional nystagmus was probably related to positional effects of perilymph volume or other microstructure rather than simple perilymph leak.

» **OTOP-51 08:50~09:00**

» Sudden sensory neural hearing loss is not predictive of myocardial infarction a longitudinal follow-up study using a national sample cohort

Bundang CHA Medical Center
So Young KIM, Tae Hyun SHIN, Cheongse WON, Mi Kyung KIM, Hyoung-Mi KIM, Chang Ho LEE

Objectives: The aim of this study was to evaluate the risk

of myocardial infarction (MI) in SSNHL subjects with differently matched control groups.

Methods:The Korean Health Insurance Review and Assessment Service - National Sample Cohort recruited subjects from 2002 to 2013. We used two study designs. In study I, we matched 4,467 SSNHL participants with a control group (17,868 subjects with no history of SSNHL) based on demographic factors (age, sex, income, and region of residence) and medical history (diabetes, dyslipidemia, and hypertension). In study II, we matched 4,467 SSNHL participants with a control group based on only demographic factors. The crude (simple) and adjusted hazard ratios (HRs) of SSNHL with MI were analyzed using the Cox- proportional hazard model.

Results:In study I, SSNHL was not associated with increased risk of MI. However, in study II, SSNHL was associated with increased risk of MI (adjusted HR = 1.39 95% CI = 1.00–1.93, P = 0.048). The SSNHL group did not exhibit increased risk of MI when compared to the control group matched by both demographic factors and medical history. However, compared to the control group not matched by medical history, the relative risk of MI was increased in the SSNHL group.

Conclusions:SSNHL was not associated with increased risk of MI when the control group was matched for age, sex, income, region of residence, and medical histories of diabetes, dyslipidemia, and hypertension.

OTOP X

RM 2-1 (Flamingo)

Chair : Jae Yong BYUN, Jae Yun JUNG

Vestibular Disorder I

» **OTOP-52 09:00~09:10**

» Hyper-responsiveness of cervical vestibular-evoked myogenic potential (cVEMP) in patients with Menieres disease (MD)

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Minbum KIM

Objectives:The purpose of this study is to investigate the hyper-responsiveness of cervical vestibular-evoked myogenic potential (cVEMP) in patients with Meniere's disease (MD). **Methods:**Thirty patients satisfied with "definite" and "probable MD" criteria, which is recently formulated by the Classification Committee of the Bárány Society, were included. The interaural amplitude difference (IAD) ratio of both ears was measured. IAD over 33% were considered as abnormal. The threshold of pure tone audiometry, caloric weakness, existence of fluctuating aural symptom and the direction of spontaneous nystagmus were also analyzed. Wilcoxon-signed rank test and Mann-Whitney U test were used for statistical analysis.

Results:Twenty one out of 30 patients (70%) showed abnormal IAD on cVEMP test (52.56±26.63%). Hyper-response at the affected ear was observed in 10(33.3%), and hypo-response was in 11(36.7%). Specifically, hyper-response was more frequently observed in the patients compatible with "Probable MD", compared to the patients with "Definite MD" (8/9 vs. 2/12, p<0.01). No statistical differences were observed between IAD, caloric weakness, and pure tone thresholds, respectively.

Conclusions:Hyper-response of cVEMP was more frequently observed in the early "probable MD" patients.

The saccular hydrops might play a important role in the initial stage of MD, and cVEMP can be helpful for the early detection of MD.

» **OTOP-53 09:10~09:20**

» Significance of repeated positional maneuver in the diagnosis of benign paroxysmal positional vertigo

Department of Otorhinolaryngology, Myongji Hospital
Dae Bo SHIM, Yong Gook SHIN, Ja Won GU,
Jin Wook KANG, Mee Hyun SONG

Objectives: Although the Dix-Hallpike and supine head roll test are considered the gold standard tests for benign paroxysmal positional vertigo (BPPV) diagnosis, accuracy rate of the diagnostic tests is not 100 percent. The aim of this study is to identify diagnostic value of repeated positional maneuver in probable BPPV (Diagnostic criterion of BPPV presented by Barany Society).

Methods: This study was prospectively performed from July 2013 to May 2017. The repeated positional test was performed in patients suspected of having BPPV in their medical history but with negative initial positional test. Repeated test was performed on the same day of the initial diagnosis in Group 1 and 3 days after in Group 2. This grouping was designed to determine whether the same-day repeated positional test is more effective in increasing diagnostic rate of BPPV.

Results: Eighty-two patients were enrolled (42 in Group 1, 40 in Group 2). Total 78 patients were analyzed because 4 patients in Group 2 were follow-up loss. 28 (35.9%) out of 78 patients were identified as BPPV by repeated positional test. Of these, 19 patients (67.9%) with posterior canal, 7 patients (25.0%) (4 patients; canalolithiasis and 3 patients; cupulolithiasis) with horizontal canal and 2 patients (7.1%) were anterior canal BPPV. The diagnostic rate of BPPV in Group 1 (42.9%) was significantly higher than in Group 2 (27.8%).

Conclusions: The repeated positional maneuver may

improve the diagnostic rate of BPPV in patients suspected of having BPPV but with negative initial positional test. In addition, performing repeated positional maneuvers on the same day as the initial diagnosis is recommended.

» **OTOP-54 09:20~09:30**

» The feasibility of MRI in the differential diagnosis of a patient with acute audiovestibular loss

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Seung Jae LEE¹, Se A LEE¹, Bo Gyung KIM¹, Ji Ye LEE², Jong Dae LEE¹

Objectives: Acute audiovestibular loss is characterized by acute onset of prolonged vertigo and hearing loss. Many neurologic conditions should be considered in the differential diagnosis of audiovestibular loss. Some authors suggest that acute audiovestibular loss is more often caused by vascular factors rather than viral causes. The purpose of this study is aimed to identify the feasibility of MRI in the differential diagnosis of patients with acute audiovestibular loss.

Methods: We retrospectively enrolled 31 patients who fulfilled the criteria for sudden hearing loss at symptom onset and showed spontaneous nystagmus from March 2007 to December 2017. Patients were excluded if the examination indicated Meniere's disease or chronic otitis media. Temporal MRI including Diffusion-Weighted Imaging (DWI) and Fast Imaging Employing Steady-state Acquisition (FIESTA) were taken in all patients.

Results: Fifteen patients showed increased signal of labyrinth on FLuid-Attenuated Inversion Recovery (FLAIR) image and 9 patients showed negative findings on MRI. Two patients showed an infarction of AICA territory in DWI MRI and 3 patients showed vestibular schwannoma in the internal auditory canal. There was no significant relevance between hearing recovery after treatment and the FLAIR

image.

Conclusions: Although MRI examination is mandatory to distinguish central vertigo in acute audiovestibular loss, the presence of AICA infarction was rarely seen and few patients showed central, non-stroke cases such as vestibular schwannoma.

» **OTOP-55 09:30~09:40**

» Hypergravity stimulation deteriorates vestibular function in the mouse with selective P2RX2 deficit

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Sang Hyun KWAK¹, Hansol HONG¹, Gyu Cheol HAN², Sung Huhn KIM¹

Objectives: P2RX2 was reported to contribute cochlear hair cell protection against severe mechanical stimulation by the stimulation of paracrine ATP. This study was designed to investigate if P2RX2 have similar function in the vestibular system.

Methods: ATP secretion in the vestibular system was investigated after mechanical stimulation by luciferin-luciferase assay. P2RX2 expression in P2RX2 KO, hetero, and wild type mice by immunocytochemistry and western blot analysis. The cation transport function of P2RX2 via vestibular transitional cell in those mice were investigated by scanning vibrating probe technique. Vestibulo-ocular reflex of those mice were analyzed with animal rotator after hypergravity acceleration stimulation (4G for 4 hour).

Results: ATP secretion was detected in the vestibular system with the order of ampulla > utricle > common crus > saccule. P2RX2 receptor was expressed and functioned in the supporting cell and transitional cell of the vestibular labyrinth with dose dependent manner in KO, hetero, and wild type P2RX2 mice. After the hypergravity stimulation, VOR gain was more decreased in P2RX2 hetero and KO mice than that of wild type (p=0.001).

Conclusions: P2RX2 contributes protection of vestibular hair cell in the situation of severe acceleration stimulation by providing cation shunt through extra-sensory epithelial cells near hair cells.

» **OTOP-56 09:40~09:50**

» The effect of increasing gain of visual sway in sensory organization test for diagnosis of peripheral vestibular disorder for peripheral vestibular disorders

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Shin Hye KIM^{1,2}, Su-Jong KIM², Seung-Hwan BANG², Jae-Jun SONG², Sung-Won CHAE²

Objectives: Balance is maintained by afferent information from visual, vestibular, and somatosensory systems. Sensory organization test (SOT) using a dynamic posturography is useful to diagnose peripheral vestibular disorder. Especially, condition 6, which trigger confusion between visual and somatosensory systems with movement of both surrounding background wall and foot plate, is a very important to assess the abnormality of the vestibular function. The purpose of this study is to analyze the effect of the degree of motion of the surrounding background wall (gain of visual sway) in SOT.

Methods: Fifteen patients with peripheral vestibular disorder performed conditions 3 and 6 of SOT at three gains of visual sway, which degree of motion of the surrounding background are 1° (Gain 1: routine procedure), 2° (Gain 2), and -1° (Gain -1). Equilibrium scores at three gains of visual sway were calculated as percentage (0~100%) based on degree of sway from vertical, and they were compared with paired t-test. sway from vertical (0~100%), and they were compared with paired t-test.

Results: On condition 3, averaged score in 15 patients were 84.9 at Gain 1, 78.5 at Gain 2, and 73.8 at Gain -1. There

was no significant difference in averaged scores between Gain 1 and Gain 2, but averaged score of Gain -1 was significantly lower than that of Gain 1 ($p=0.01$). Otherwise, on condition 6, averaged score in 15 patients were 19.8 at Gain 1, 6.6 at Gain 2, and 20.2 at Gain -1. There was no significant difference in averaged scores between Gain 1 and Gain -1, but averaged score of Gain 2 was significantly lower than that of Gain 1 ($p=0.001$).

Conclusions:The results of condition 6 showed that the patient's balance ability was significantly decreased when increasing gain of visual sway. Therefore, set-up the degree of motion of the surrounding background wall higher in SOT may be helpful to detect patients with peripheral vestibular disorder more sensitive.

» **OTOP-57 09:50~10:00**

» Analysis of the video head impulse test during vestibular compensation in acute unilateral vestibulopathy

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**Hyun Ji KIM, Sung Hoon KIM, Hong Ju KIM,
Kyu-Sung KIM**

Objectives:Acute unilateral vestibulopathy results in asymmetry in the vestibulo-ocular and vestibulo-spinal response, caused by damage of the peripheral vestibular structures. The static signs tend to disappear spontaneously, some patients have more difficulties in recovering the dynamic functions. It has been considered as associated with compensation mechanism. We aimed to analyze the clinical implication of serial video head impulse test whether it does reflect the signs of vestibular compensation and predict the outcomes of these patients.

Methods:Fifty two patients who had treated acute vertigo and diagnosed as unilateral vestibular neuritis were included in this study. Clinical data including the symptoms and signs of vertigo were investigated retrospectively. Only those who performed at least 2 video head impulse tests at the

appointed time. We compared these two parametric results with the results of caloric test and rotational tests. We also reviewed the examiner's factor, device problems and patients compliance.

Results:The patients were 32 males and 20 females. The mean age was 50.02 ± 2.90 years. Among the patients, 22.7% (Group A) showed complete resolution on 2nd video head impulse test. These patients showed normal gain values without catch up saccades. 13.6% showed improved gain with catch up saccades. In the 63.6% patients (Group D), decreased gain with catch up saccades were identified. In this group, partial improvement of gains were shown but they were still exist in abnormal range. The amplitude of catch up saccades were not changed. Group D patients showed higher initial gain and worse CP than group A patients, significantly.

Conclusions:In terms of vestibular restoration, 63.6% patients showed partial improvement of gain values remaining catch up saccades. Catch up saccades did not improve without change of gain values. During the recovery of the vestibulo-ocular reflex, gain recovery occurs ahead of changes of catch up saccades. And it was correlated with initial vestibular deficit.

» **OTOP-58 10:00~10:10**

» Peripheral vestibulopathy presenting as acute vestibular syndrome with negative video head impulse test

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University School of Medicine*

**Jung Yup LEE, Min-Beom KIM, Sun O CHANG,
Jin Su PARK**

Objectives:To analyze the clinical characteristics of patients with acute vestibular syndrome (AVS) who showed negative video head impulse test (vHIT)

Methods:Patients: During 16 months, 412 patients with isolated dizziness underwent the vHIT. Of these 412,

155(37.6%) of AVS were identified due to presence of spontaneous nystagmus and postural imbalance. Of these 155, 30(19.4%) were finally enrolled in this study because they did not show gain loss or catch up saccades in both of the horizontal vHIT. Main Outcome Measure: Data on demographics (age, gender), results of vestibular function tests [video-nystagmography, horizontal vHIT, caloric test, and cervical vestibular evoked myogenic potential (cVEMP)] were analyzed. All cases were checked brain MRI including diffusion scan to evaluate central lesion.

Results: The mean age of the 30 patients was 48.30 ± 14.34 . The 30 patients consisted of 17 cases of Meniere's disease (MD), 7 of sudden sensorineural hearing loss (SSNHL), and only 3 cases (3/30, 10%) were finally diagnosed as acute vascular stroke. Of the 17 patients with MD, only 5 patients had unilateral canal paresis on caloric test. The direction of the spontaneous nystagmus, caloric test and cVEMP results were not consistent and a variety of patterns were observed in MD. All 7 patients with SSNHL did not have canal paresis on the caloric test, but amplitude of cVEMP was smaller on lesion side in 6 patients.

Conclusions: In patients with AVS, even in negative vHIT, peripheral vestibulopathy were still more common compared with acute vascular stroke. Of these patients, it is necessary to confirm hearing because of a high possibility of MD or SSNHL. In particular, negative vHIT in SSNHL with vertigo might be affected by involvement of inferior vestibular nerve or saccule.

» **OTOP-59 10:10~10:20**

» Comparison of MR spectroscopy and cerebral gray matter volume in vestibular neuronitis patients

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**Jeong Wook KANG, Young Min HAH, Sang
Hoon KIM, Seung Geun YEO, Geon Ho JAHNG,**

Moon Suh PARK, Jae Yong BYUN

Objectives: There are many physiological, clinical and functional imaging evidence for central vestibular compensation following unilateral peripheral vestibular lesions. However, little is known how this imbalance affects neurochemical activity in compensating process. The purpose of this investigation was to assess the correlation between the brain metabolic alteration and structural change.

Methods: We compared the MRS study of unilateral VN patients who were hospitalized at Kyunghee University Hospital from 2016 to 2017. The MRS study was performed before treatment and at three months after treatment. We compared changes in cerebral gray matter volume and changes in glial metabolite markers in the patients.

Results: Although it's not statistically significant, we could observe changes in glial metabolite markers of posterior parietal operculum and gray matter volumes in the middle temporal gyrus before and after treatment. At the same time, these two changes showed a correlation with each other.

Conclusions: There are correlations between several glial metabolite markers and cerebral gray matter volume in long-term follow up of vestibular neuronitis patients.

OTOP XI

RM 2-1 (Flamingo)

Chair : Moo Jin BAEK, Sang Yoo PARK

Auditory Rehab I

» **OTOP-60** 10:40~10:50

» Comparison of auditory outcome between inpatient and outpatient based treatment in sudden sensorineural hearing loss

Department of Otolaryngology-Head and Neck Surgery, Incheon St Marys Hospital, College of Medicine, The Catholic University of Korea
Hyun Jin LEE, Eun-Ju JEON

Objectives: The standard treatment for sudden sensorineural hearing loss(SSHL) has been hospital admission and steroid administration combined with several medications including vasodilators. Administration of steroid can be given either systemically(SS) or by intratympanic injection(ITS). The aim of this study is to evaluate the auditory outcome in SS group and ITS group and to assess the necessity of hospital admission for treatment of SSHL. **Methods:** Retrospective chart review was performed for 75 patients with SSNHL. The patients were divided into 4 groups according to the method of steroid administration(SS vs. ITS) and the way of patient care setting(inpatient(IN) vs. outpatient(OUT)). The patients with follow up period more than 2 months were included. In SS group, patients received oral prednisolone starting with dose of 1 mg/Kg for 5 days and tapering dose for consecutive 5 days. In ITS group, intratympanic injection of 0.5 mL of dexamethasone was given 4 times for 2 weeks. In inpatient group, combination therapy was performed for 7~10 days including vasodilators, carbogen inhalation, etc. Significant hearing improvement was considered to be greater than 15 dB change in 4-frequency pure tone average(PTA).

Results: PTA improvement was found in 57.6% of SS-IN group, and it was highest recovery rate compared to other groups(10~50%). SS-IN, ITS-IN and ITS-out group showed significant hearing improvement after long term follow up ($P<0.001$, $P<0.05$ and $P<0.001$). When we compared the last follow up hearing gain in each groups, SS-IN group showed more significant improvement than SS-out group, especially ($P<0.001$).

Conclusions: SS-IN group showed the highest rate of hearing improvement and more hearing gain than SS-OUT group. Inpatient based systemic steroid therapy seems to be the better treatment option for SSHL patients. ITS-OUT is recommended as an outpatient based treatment option when admission is not possible.

» **OTOP-61** 10:50~11:00

» Audiologic, surgical, subjective outcomes of active transcutaneous bone conduction implant system (Bonebridge)

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Se-Joon OH¹, Soo-Keun KONG¹, Sung-Won CHOI¹, Dong-Won KIM¹, Hyun-Min LEE², Da-Hee PARK², Eui-Kyung GOH¹

Objectives: Bone conduction implant device is one of the important rehabilitation option for patients with mixed, conductive hearing loss or single sided deafness. This study aimed to report the audiologic, surgical and subjective outcomes with bone conduction implant (Bonebridge) (BB).

Methods: This retrospective study included BB system cases which have been done at our tertiary medical center between 2015 and 2017. Outcomes were collected from the follow up by conducting sound field audiometric

thresholds, speech recognition in quiet and noise and by asking patient hearing benefit and subjective satisfaction using questionnaires such as Abbreviated Profile of Hearing Aid Benefit (APHAB) and Korean version of International Outcome Inventory for Hearing Aids (K-IOI-HA). We further investigated about whether several surgical, anatomical considerations were associated with audiometric gain.

Results:Total 27 cases collected. (22 cases of single side deafness(SSD), 5 cases of mixed or conductive type hearing loss). Audiologic outcomes revealed a significant improvement in functional gain and speech recognition in noise with various SNR settings. In 10 cases, canal wall down surgery was conducted simultaneously or already have been conducted, which did not affect negative effect on audiologic outcomes. The mean Korean Version of Abbreviated profile of hearing aid benefit (K-APHAB) and Korean version of International Outcome Inventory for Hearing Aids (K-IOI-HA) score was better in the implanted condition as total and partial scores.

Conclusions:The BB as an active bone conduction device provides an effective hearing rehabilitation for patients with not only mixed/conductive hearing loss but also SSD. This new auditory rehabilitation technique gave the patients with improved quality of life and hearing.

» **OTOP-62 11:00~11:10**

» Electrical partial stimulation for patients with normal low-frequency hearing

Soree Ear Clinic

You-Ree SHIN, Seong-Cheon BAE, Kyung-Ray MOON, Hye Jin LIM, Kwang Sun LEE, Chong-Sun KIM, Young-Myoung CHUN

Objectives:Among patients with partial deafness, there is a group of patients with normal low-frequency hearing. They have tried to wear a hearing aid but have failed. The remaining method for these patients is cochlear implant and we wanted to study the following. 1. Is Electrical partial

stimulation beneficial to hearing rehabilitation in language and music? 2. Hearing preservation results in this group. 3. Is there a subjective satisfaction with the patient after the operation? 4. Proper fitting method for Electrical partial stimulation

Methods:From August 2012 to July 2017, data were retrospectively analyzed in 10 patients who underwent CI surgery in Soree Ear Clinic. Their hearing was normal at low frequencies(<30dB until 250Hz) and suddenly dropped to high frequencies. The age of the patients was 20-48 years. The mean age was 34.2 years (7 female and 3 male). We analyzed these data. Speech performance (syllable, sentence, HINT), music evaluation according to time before and after surgery. Hearing preservation rate (Correction by reduction of opposite hearing) Nijmegen cochlear implant questionnaire. (before and after surgery) and fitting results.

Results:Electrical partial stimulation is effective for hearing rehabilitation for these partial deafness patients. Speech performance was improved and music score was maintained. Hearing preservation rate was 80% and residual hearing was well maintained over time. There were two patients with hearing loss, but the two patients were using EAS(hybrid) mode. Nijmegen cochlear implant questionnaire showed improved life quality especially self-esteem. The proper fitting method of Electrical partial stimulation was GAP.

Conclusions:In patients with partial deafness, especially in patients with low frequency hearing, electrical partial stimulation can improve speech performance while preserving low frequency hearing and may be the best way to overcome the limitations of current CI.

» **OTOP-63 11:10~11:20**

» Speech perception and language outcome in congenitally deaf children receiving cochlear implants in the first year of life

*Department of Otolaryngology-Head and Neck Surgery,
College of Medicine, Dong-A University*

**Lee-Suk KIM, Sung Wook JEONG, Ji-Won SEO,
Sung-Hyung BOO**

Objectives:The objective of this study was to examine the effect of early cochlear implantation (CI) performed in infants less than 12 month of age.

Methods:Twenty-five children who received their first CI before 12 months of age were included in this study (infant group). The speech perception and language outcomes of them were compared with those of 14 children who received their first CI between 13 months and 24 months of age (older group). All the children received sequential bilateral CI with inter-stage interval less than 2 years. Speech perception was measured using CAP, monosyllabic word test and sentence test and language ability was measured using SELSI, PRES, or REVT depending on the age at test.

Results:There were no significant differences in speech perception abilities between infant group and older group. Mean expressive language score of infant group was higher than that of older group, but the difference was not statistically significant. However receptive language score of infant group was significantly higher than that of older group.

Conclusions:Children who received CI before 12 months of age achieved better receptive language ability than those who received CI after 12 months of age. CI should be performed as soon as possible before 12 months of age to achieve better language ability.

» **OTOP-64 11:20~11:30**

» Analysis and categorization of problems in the mapping of CI referral cases

*Department of Otorhinolaryngology-Head and Neck
Surgery, Korea University College of Medicine*
**Euyhyun PARK, Pyung Gon THAK, Hak Hyun
JUNG, Gi Jung IM**

Objectives:The aim of this study is the analysis and

categorization of common problems in the CI mapping, and to further consideration of mapping solutions from our past experience.

Methods:This study included 31 patients who had undergone CI and were referred for CI mapping to our hospital from another medical centers. All patients were pre-lingual hearing impaired CI users who were implanted with a Cochlear Nucleus. The physical examination and radiologic study were taken by an experienced otologist. Speech perception test and standardized articulation test named U-TAP (Urimal Test of Articulation and Phonation) were evaluated by a speech therapist before and after the mapping. Mapping was controlled and adjusted by a CI mapping specialist.

Results:Articulation problem was most common (87.1%) subjective problem in CI patients of this study, and second problem was speech perception (38.7%). In addition, patients complained of uncomfortable sound level, eye twitching, and abnormal voice tone. In the mapping status of our evaluation, inappropriate setting of the threshold (T) and comfortable (C) level was most common (96.8%) problem, and narrow dynamic range was second (61.3%). In addition, "out-of-compliance" and electrode problems can be categorization of the objective mapping problems. After the evaluation, the fine adjustment of the mapping was done through the close collaboration of otologist, speech therapist, and the audiologist. Compared with initial evaluation, significant gain of speech perception test and U-TAP score were observed.

Conclusions:Speech production and perception problem was the common complaints of CI patients. Inappropriate setting of T and C level was most common problems of CI mapping. Close collaboration between the otologist, speech therapist and audiologist enable appropriate audiological development of CI patients and it seems the most important process in CI mapping.

» **OTOP-65 11:30~11:40**

» Long-term outcome of hearing preservation in cochlear implantation via round window approach

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University School of Medicine, ²Department of
Otorhinolaryngology, Ajou University Hospital
**Jeong Hun JANG^{1,2}, Hyoung Ah MUN², Oak-
Sung CHOO^{1,2}, Hun Yi PARK^{1,2},
Yun-Hoon CHOUNG^{1,2}**

Objectives: This study was designed to analyze the outcomes of low-frequency hearing preservation (HP) 1 year after cochlear implantation (CI) and to identify the prognostic variables associated with residual low-frequency HP.

Methods: Among the patients who underwent CI at the Ajou University Hospital, 36 patients with preoperative pure tone average ≤ 85 dB HL on 125, 250, and 500 Hz were included. There were 14 males and 22 females with a mean age of 37.0 years (range: 5.1-84.8). Preoperative pure tone average was 65.3 ± 15.4 dB HL. The straight type electrode was inserted via round window approach in all patients. Sixteen patients received Cochlear devices and 20 patients received MEDEL devices. The change of pure tone average was categorized after CI (1, 6, 12 month): 'completely preserved (≤ 10 dB)', 'partially preserved (between 10 dB and 30 dB)', and 'failure (> 30 dB)'. The preservation of residual hearing was defined in cases of 'completely preserved' or 'partially preserved'.

Results: Of the thirty six patients, the HP was observed in 25 patients (69%) 1 month after CI ('Completely preserved', N=11; 'partially preserved', N=14), 24 patients (67%) 6 months after CI ('Completely preserved', N=11; 'partially preserved', N=13), and 23 patients (64%) 1 year after CI ('Completely preserved', N=13; 'partially preserved', N=10). In multivariate regression, age was the only significant prognostic factor for better HP ($p < .05$) at short term (1 month and 6 months) and long term follow-ups.

Conclusions: HP can be achieved until 1 year after CI and the age is associated with better HP outcomes. Further follow-up for more than 1 year could be needed to investigate the gradual deterioration of HP with time by

the natural progression of hearing loss.

OTOP XII

RM 2-1 (Flamingo)

Chair : He Il NOH, Il Woo LEE

Auditory Rehab II

» **OTOP-66 11:40~11:50**

» Theory of mind development in children with cochlear implants

¹Department of Child Development & Family Studies,
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of Otolaryngology-Head and Neck Surgery, Dong-A
University College of Medicine, Busan, Korea

**Young Mi CHOI^{1,2}, Hee Hwa KIM¹, Sung-Wook
JEONG², Lee Suk KIM²**

Objectives: Theory of Mind (ToM) refers to the ability to recognize mental states of other people and to predict other people's behavior. ToM is a crucial ability for children's prosocial behavior and social relations. The deficiency of ToM is a characteristic of the children with autism and the populations of deaf children have been reported to show problems in ToM. The purpose of this study was to examine ToM of children with cochlear implant (CI).

Methods: Fifty children who received their first CI before 3.5 years of age and age-matched 50 children with normal hearing were included in this study. They were divided into 3 groups according to age (toddler, preschooler, schooler). Their ToM was assessed using Korean version of Theory of Mind Task Battery (ToM-TB) and Theory of Mind Inventory (ToM-I) and the ToM of CI children was compared to that of NH children.

Results: There were no significant differences in both ToM-I and ToM-TB score between CI children and NH children in toddler and preschooler groups. In schooler

group, ToM-I score was not significantly different between CI children and NH children but ToM-TB score of CI children was significantly lower than that of NH children. Conclusions: ToM ability of CI children is quantitatively comparable to that of NH children but not in qualitative domains. The ability of CI children can be weaker than NH children. Therefore the intervention to improve ToM ability as well as the speech-language habilitation is required for CI children.

» **OTOP-67 11:50~12:00**

» Preoperative audio-visual speech perception influences on audio-visual, but not audio-only performance of cochlear implantation in post-lingual adults

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Jinsei JUNG¹, Hyung Jin LEE², Jae Young CHOI¹

Objectives: Postlingual deaf patients usually depend on the visual information in their deaf period, and their lipreading ability could influence on CI outcomes. Auditory cortex reorganization by visual information is a current issue in cochlear implantation (CI) outcome. In the present study, we aimed to evaluate the association between the preoperative auditory-visual perception and CI outcomes.

Methods: In this retrospective case-comparison study, we assessed 75 patients with postlingual deaf patients who underwent unilateral CI at a single tertiary referral hospital. Speech perception test was performed with both auditory-visual (AV) and auditory-only (AO) status before and after the implantation. All patients also evaluated the Category of Auditory Performance (CAP) scores.

Results: There is no significant correlation between deaf duration and postoperative AO (pAO) speech perception ($R^2=0.0005084$, $P=0.8477$). There is also no significant correlation between deaf duration and postoperative AV

(pAV) speech perception ($R^2=0.0007705$, $P=0.4539$). There is no significant correlation between iAV speech perception and pAO speech perception ($R^2=0.00006475$, $P=0.9454$). However, iAV and pAV speech perception only shows a positive correlation, significantly ($R^2 = 0.1041$, $p < 0.05$).

Conclusions: The results of the present study suggest that the patients with the better iAV speech perception showed the better pAV speech perception, which means patients who have a good initial speech perception with enhanced lipreading

» **OTOP-68 12:00~12:10**

» For evaluation of the efficacy for hyperbaric oxygen therapy(HBO) in sudden sensorineural hearing loss(SSNHL)

Department of Otorhinolaryngology, Wonju Severance Christian Hospital
Young Sub LEE, Young Joon SEO

Objectives: For evaluation of the efficacy for hyperbaric oxygen therapy in sudden sensorineural hearing loss

Methods: We recruited 218 patients treated for SSNHL during the period from January 2010 to July 2017. Patients were divided into 2 groups according to insurance policy applied standard of pure tone audiometry 80 dB for Hyperbaric oxygen therapy. Recovery was evaluated by pure tone audiometry and was considered recovery when showed 15dB elevation. Recovery duration was evaluated by the date from the first pure tone audiometry to the date of recovery recorded. General characteristic between the groups were evaluated by ANOVA and Chi-square test. Pure tones between the groups were evaluated by ANOVA and Kruskal-Wallis test. Box-Whisker plot was used to evaluate the pure tone distribution and the recovery duration was analyzed by Kaplan-Meier method.

Results: 3 groups with higher than 80dB hearing impairment were compared for pure tone audiometry recovery gap and duration. P-value for both criteria was

0.0765 and 0.2938. However, for the 3 groups with lower than 80dB hearing impairment, the pure tone audiometry recovery for oral steroid therapy alone was 22.19dB, the pure tone audiometry recovery for oral steroid and IT dexamethasone therapy was 22.16dB, and the pure tone audiometry recovery for oral steroid, IT dexamethasone, and hyperbaric therapy was 37.71dB, showing that the group with hyperbaric oxygen therapy had better recovery. The p-value for recovery duration was also <0.01. The frequency with the biggest recovery was on 250Hz, and 500Hz.

Conclusions:Currently, the insurance policy only covers the fee for hyperbaric oxygen therapy on patients with higher than 80dB hearing loss, which is already a severe level of hearing loss less likely to recover even with hyperbaric oxygen therapy. Therefore, we argue for lowering the insurance standard so patients with lower than 80dB hearing loss who are more likely to benefit from the hyperbaric oxygen therapy.

» **OTOP-69 12:10~12:20**

» The long-term results of residual hearing and vestibular function after cochlear implantation

¹Department of Otorhinolaryngology, Ajou University School of Medicine, ²Department of Otorhinolaryngology, Ajou University Hospital

**Jeong Hun JANG^{1,2}, Mi You KOH²,
Oak-Sung CHOO^{1,2}, Hun Yi PARK^{1,2},
Yun-Hoon CHOUNG^{1,2}**

Objectives:This study was designed to evaluate the long-term results of residual hearing and the vestibular function after cochlear implantation (CI).

Methods:Among 401 patients who underwent the CI between February 2002 and December 2017 at the department of otorhinolaryngology Ajou University Hospital, 140 patients with the results of hearing and vestibular function tests were included. Pure tone audiometry, video nystagmography (VNG), caloric test,

rotation chair test (RCT), step velocity, vestibular evoked myogenic potential (VEMP) test, and SVV/SVH were performed preoperatively, 6 months (6m) postoperatively. The relationship between hearing and vestibular changes was analyzed.

Results:Thirty patients (21.4%) reported subjective dizziness before CI and postoperative dizziness was reported in 27 patients (19.3%) at 6m after CI. Spontaneous nystagmus was detected in 8 patients (6.3%) preoperatively and 11 patients (6.7%) at 6m after CI. Canal paresis in the CI side increased postoperatively (preoperative, 11; postoperative 6m, 16). Posturography showed abnormality in 14 patients (19.7%) preoperatively and 18 patients (25.4%) at 6m after CI. RCT was abnormal in 53 patients (48.2%) preoperatively and 62 patients (56.4%) at 6m after CI. Asymmetry in RCT was 14 patients (12.7%) preoperatively and 9 patients (8.2%) at 6m after CI. VEMP was abnormal in 52 patients (65%) preoperatively and 57 patients (71.3%) at 6m after CI. The patients with abnormal SVV/SVH (6, 42.9%/3, 23.1%) increased at 6m after CI (7, 50%/7, 53.8%). The change of vestibular function was compared between the hearing preservation (HP) group and non-HP group. The proportion of vestibular preservation was higher in HP group than non-HP group for caloric test, posturography, and RCT but lower for spontaneous nystagmus and VEMP.

Conclusions:CI could be a relevant risk factor for damage of vestibular function of the implanted side. The preservation of vestibular function as well as residual hearing function should be considered.

» **OTOP-70 12:20~12:30**

» Application of non-implantable bone conduction hearing aid Adhere in clinics preliminary report

Department of Otorhinolaryngology, Seoul National University Bundang Hospital

**Young Seok KIM, Seulki SONG, Jeongyeon JI,
Jae Joon HAN, Hye-Rim PARK, Ja-Won KOO,
Byung Yoon CHOI**

Objectives: Children under the age of five are not candidates of surgically implantable BCHI and a substantial portion of patients or parents are reluctant to undergo operations. However, so far, the soft band BCHI have failed to fascinate the patients mainly due to its user unfriendly cosmetic feature and heaviness. To offer them the advantage of bone conduction hearing aid (BCHI) while avoiding the drawbacks of Soft band BCHI, non-surgical BCHI 'Adhere' was launched. We aimed to share the preliminary experience of Adhere tested for its candidacy for children with either congenital aural atresia or single side deafness in our clinics.

Methods: We tested mainly three groups of children (N=8) for candidacy of Adhere application in our clinics. Children with CAA (mainly unilateral) under the age of three (n=5, mean age=1.5Y) or children with SSD (n=2, mean age=10Y) old enough to provide their feedback to parents or clinicians. And children with bilateral CHL (n=1, age=6.1Y). For the CAA group, the parents were counseled with a special focus on the potential preventive effect from development of aural preference. For the latter group, patients themselves subjectively evaluated the benefit and their parents decided whether or not they purchase the device. In addition to these groups, one 4 year old child (n=1) with BCHL with slightly narrow but patent EAC was also tested for candidacy.

Results: Among the total eight children, three subjects decided to purchase the device. Breaking down these according to the group, two of CAA group subjects purchased while one of SSD subjects purchased Adhere.

Conclusions: A substantial portion of children or parents who are eligible for BCHI and are provided with an explanation about a non-surgical option of BCHI seem to be willing to wear Adhere after trial. With the advent of Adhere, children with unilateral CAA not yet eligible either for canaloplasty nor implantable BCHI due to young age as well as old children with SSD seem to be likely to easily benefit from BCHI than before.

» **OTOP-71 12:30~12:40**

» **The efficacy of Korean hearing in noise test (K-HINT) for hearing aid validation**

*Department of Otolaryngology, Ajou University School
of Medicine*

**Oak-Sung CHOO, Young Sook KANG, Jeong
Hun JANG, Hun Yi PARK, Yun-Hoon CHOUNG**

Objectives: Patients with hearing aids (HAs) expect enhancement of speech recognition even in noisy environments. For objective validity of speech recognition under noise, K-HINT is a representative test. In this study, we analyzed this specific condition with K-HINT, and evaluated the correlation between objective K-HINT scores and subjective satisfaction measures of everyday HA use.

Methods: Subjects included patients with bilateral downward-sloping sensorineural hearing loss. Under a retrospective review, 64 patients were enrolled with mean age of 66.3 years old and average of 50.8dB. Before HA use, PTA, SA, and K-HINT were performed for objective measures along with the HHIE survey for subjective measures. After 3 months of HA use, FGT, aided-SA, K-HINT, HHIE survey, and IOI-HA survey were done. Comparison of K-HINT scores before and after HAs, and changes in survey scores were analyzed. In addition, correlations between the objective and subjective tests were also evaluated.

Results: After use of HAs, enhancement of speech recognition was noticed as well as results of K-HINT, especially in quiet, noise front, and noise composite conditions showing significant values ($p < 0.05$). The HHIE scores also improved after HA use ($p < 0.05$). The correlation of different tests only showed significance between K-HINT and HHIE however, the degree of changes were not relevant with one another. Lastly, HINT noise composite scores showed significant relevance with both social and circumstantial categories.

Conclusions: Improvement of K-HINT scores after HA use was not able to precisely predict the subjective

satisfaction and/or impact of HA use however, K-HINT highly represents speech recognition abilities in noisy environments. Thus, it may be helpful during HA counseling, selection, and adjustment. We believe that the K-HINT is a useful measuring tool for HA validation along with other auditory evaluation tests that are currently used in the clinical field.

OTOP XIII

RM 2-1 (Flamingo)

Chair : Chang Hyun CHO, Kyoung Ho PARK

Otitis Media & Cholesteatoma II

» **OTOP-72 13:30~13:40**

» The evaluation of simultaneous bilateral chronic otitis media surgery

*Department of Otolaryngology, Seoul National
University, Boramae Medical Center*

Sang-yoon HAN, Ye Ji SIM, Min-Hyun PARK

Objectives: Simultaneous bilateral chronic otitis media (BCOM) surgery isn't performed due to some reasons. The most important reason is possibility of bilateral iatrogenic hearing loss, but some articles showed that it didn't made severe hearing loss and led to save time and cost with similar results of sequential surgery. Since, simultaneous BCOM surgery could be safe and comfortable, this study evaluates its' efficacy.

Methods: From 2012 to 2017, 410 patients got COM surgery and 6 patients (M:F=5:1, mean age: 59.2±5.8) got simultaneous bilateral surgery. Especially, one got right CI and left COM surgery after 1 week. Their hospital period, graft success, tolerability, audiogram (calculated with four fraction method. if scale out, threshold was used. 2 patients – no postoperative audiogram) was statistically analyzed.

Results: For the 5 same day surgery patients, mean

hospital period was 4.5±0.8 days, which was much shorter than that of sequential surgery (8 days). All grafts were successfully attached without complication. Mean pain VAS was 2.4±1.4. In better side, pre/post-operative mean air conduction audiogram (AC) was 66.6±15.5/57.5±15.1 dB (p=0.144), mean bone conduction audiogram (BC) was 48.1±13.1/40±13.2 dB (p=0.357) and the air-bone gap (ABG) was 18.4±2.8/17.2±5.4 dB and all postoperative AC was better than preoperative. In worse side, pre/post-operative mean AC was 87.5±12.6/74.1±27.7 dB (p=0.068), mean BC was 53.1±10.1/48.4±14.1 dB (p=0.109), ABG was 34.4±8.7/25.6±17.8 dB (p=0.465) and postoperative AC was better than preoperative except for 1 subjects. And all ears' postoperative BC was equivocal to or better than preoperative.

Conclusions: Despite no complete consensus, if there was asymmetric hearing loss with single side severe hearing loss, worse hearing preservation shouldn't be considered to do better ear surgery. And simultaneous BCOM surgery saves time, cost and leads similar results with sequential surgery, so it could be a good choice for the asymmetric severe hearing loss patient.

» **OTOP-73 13:40~13:50**

» Prescription rate of antibiotics in pediatric acute otitis media and exudative otitis media in Korea

*Department of Otolaryngology-Head and Neck
Surgery, Chonbuk National University School of
Medicine*

**Eun Jung LEE, Jong Seung KIM, Cha Dong
YEO, Baek Hwa HAN**

Objectives: To evaluate the use of antibiotics in pediatric acute otitis media (AOM) and exudative otitis media (OME) in Korea and to investigate the factors which increase the rate of antibiotic usage.

Methods: We collected data from the Health Insurance Review & Assessment (HIRA) Big Data system, which supplied data on 15,814,732 children with otitis media

throughout the period from January 2012 to December 2016. The primary outcome was antibiotic prescription rate in children in terms of overall rate, seasonal variation, medical specialty, age, hospital size (primary, secondary, tertiary), and concomitant disease

Results:The antibiotic prescription rate in pediatric otitis media has been on a steady decline from 2012 to 2016, with annual rates of 88.67%, 86.54%, 85.84%, 85.39% and 84.46%, respectively. There was no significant seasonal variation in prescription rate. With regard to medical specialty, ENT and Family Medicine (FM) (specialists who qualify after 1-year internship and 3-year resident training) prescribed similar rates which were lower than the antibiotic prescription rates for Internal Medicine (IM) and pediatricians. Acute sinusitis (AS) increased the antibiotic prescription rate in AOM and OME; however, acute tonsillitis (AT) only increased the prescription rate in OME.

Conclusions:From 2012 to 2016, HIRA data showed that the antibiotic prescription rate for pediatric otitis media in Korea decreased gradually in both AOM and OME. AS is a companion disease that maximizes the antibiotic prescription rate of pediatric otitis media.

» **OTOP-74 13:50~14:00**

» Transcanal simple underlay myringoplasty in elderly patients over 70 years old

Department of Otorhinolaryngology-Head and Neck Surgery, University of Ulsan College of Medicine, Ulsan University Hospital

Tae-Uk CHEON, Jung On LEE, Yeong Jun SONG, Joong Keun KWON

Objectives:Elderly patients have higher risk of postoperative delirium and cognitive dysfunction after surgery. Fragility, surgical experience including hospitalization, and neurotoxic effect of anesthetics are suggested as causative factors of those complications. Transcanal simple underlay myringoplasty (SUM) is minimally invasive surgery and

could be done for elderly patients under local anesthesia with less physical and psychological risk. This study aims to evaluate the surgical results of SUM for elderly patients over 70 years old.

Methods:Among 174 patients treated by SUM (2009 - 2016), results of 21 patients over 70 years old were compared with those of 8 patients treated by canal wall up mastoidectomy with tympanoplasty type 1 (CWUMT1). To evaluate the age factor on SUM results, records of SUM in 153 patients less than 70 years old were compared with those of patients over 70 years old. Reviewed parameters were graft success rate and pure tone audiometry (PTA). Audiological comparisons were limited to patients with PTA checked over 6 months after surgery. Paired t-test, student t-test, and χ^2 -test were used with 95% CI.

Results:Graft success rate: Graft success rate were 90.5% for SUM vs. 100 % for CWUMT1 in patients over 70 years old ($p=1.000$). Success rate was 82.4% for SUM patients less than 70 years old ($p=.534$). Audiological comparison: For patients over 70 years old, 12 SUM & 7 CWUMT1 cases were eligible. There were no differences in preoperative bone & air conduction thresholds (SUM 41.5 / 58.8 dB vs. CWUMT1 40.1 / 64.1 dB). Air-bone gap (ABG) significantly improved after surgery in SUM cases (SUM 17.3→5.8 dB ($p=.001$) vs. CWUMT1 24.0→14.6 dB ($p=0.266$)). There was no difference in postoperative ABG changes ($p=0.806$). For SUM patients less than 70 years old, 107 cases were qualified for PTA comparison. Preoperative bone and air conduction thresholds were significantly better in younger patient group (18.4 / 31.0 dB). Postoperative ABG significantly improved in patients less than 70 years old (12.6→7.2 dB). Improvement of ABG changes were less than those of patients over 70 years old ($p=0.022$).

Conclusions:SUM seems to be safe and effective method in COM in patients over 70 years old in terms of graft success rate and audiological improvement.

» **OTOP-75 14:00~14:10**

» Inlay versus underlay cartilage tympanoplasty

for chronic inactive mucosal otitis media

*Dep. of Otorhinolaryngology, Cairo Univ. College of
Medicine, Egypt*

Shazly M, Hassouna M, Hassan O Esmat Mina

Objectives:to compare the inlay butterfly cartilage myringoplasty versus underlay cartilage tympanoplasty mainly in terms of the graft take rate and hearing outcome in addition to assessment of complications with both techniques.

Methods:This is a prospective study, forty participants were recruited through patients aging between 15 to 60 years old, with dry central tympanic membrane perforations, presenting at otorhinolaryngology outpatient clinic at faculty of medicine, Cairo University. The 40 patients were then divided into 2 groups. 17 patients underwent inlay butterfly myringoplasty through a trans-canal approach while 23 patients underwent underlay cartilage tympanoplasty through a post-auricular approach. Follow up was done with mean of 3.4 months and audiological assessment by pure tone audiometry was done 1 month post-operatively.

Results:For inlay group, 64.7% of the patients had a completely healed tympanic membrane postoperatively, 17.6% of the patients had a partially (nearly 50%) healed tympanic membrane. Mean AB gap closure was 4 db. For underlay group, 82.6% of the patients had a completely healed tympanic membrane postoperatively. Mean AB gap closure was 4.7 db. No major complications were reported with both groups. These results show no statistically significant difference between both groups in terms of graft take and hearing improvement ($p = 0.149$).

Conclusions:Inlay butterfly myringoplasty is reliable as an easy and time saving procedure that can be done in cases with eardrum perforations as an alternative to underlay technique. Results are comparable with underlay technique in terms of graft take rate and hearing improvement. Procedure is better in terms of decreasing operative time, postoperative pain and duration before resuming usual

activities.

» **OTOP-76 14:10~14:20**

» Impact of nasal conditions on chronic otitis media: A cross-sectional study in Koreans

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Kyung Wook HEO¹, Min Jae KIM², Jun Ho LEE²

Objectives:We evaluated the relationship between pathological nasal conditions and pathological middle ear conditions on a large-scale epidemiological basis, conducted as a cross-sectional study at the population level using Korean National Health and Nutrition Examination Survey (KNHANES) data.

Methods:In a retrospective cohort study, we analyzed data from the KNHANES (2008-2012), which used a stratified, multi-stage, probability-cluster sampling method in a rolling sampling survey of South Korean citizens.

Results:The prevalences of nasal and middle ear pathologies were evaluated. Chronic postnasal drip, chronic hypertrophic rhinitis, and nasal polyps were correlated with the presence of middle ear pathologies; allergic rhinitis was negatively correlated. The prevalences of chronic otitis media and septal deviation showed no relationship. Only nasal polyps showed a tendency to be associated with cholesteatomatous otitis media in patients with COM.

Conclusions:Our results indicate the need for a nasal assessment when evaluating COM. Additionally, correction of nasal pathologies may be useful with the surgical treatment of COM to improve patient success rates and satisfaction.

» **OTOP-77 14:20~14:30**

» Paper patch in the re-perforated tympanic

membrane after tympanoplasty

*Department of Otorhinolaryngology-Head and Neck
surgery, Asan medical center, University of Ulsan
College of Medicine*

**Ja Yoon KU, Joong Ho AHN, Hong Ju
PARK, Jong Woo CHUNG, Woo Seok KANG**

Objectives: This study was aimed to analyze the result of paper patch application in re-perforated tympanic membrane (TM) after tympanoplasty.

Methods: Twenty patients (8 males and 12 females) were included in this study and they had re-perforated TM following tympanoplasty or tympanomastoidectomy done between April 2016 and Jan 2017. Fourteen patients underwent paper patch application after refreshing the perforated margins at outpatient clinic. They were followed up 2 weeks later to check the status of the TM. Paper patch application was done again if it was dislocated from the previous location. No treatment was done in 6 patients. The closure rate of the perforation was analyzed between two groups.

Results: Patients' mean age was 54.3 years. Among twenty patients, 13 patients underwent tympanomastoidectomy and 7 patients had tympanoplasty. Eighteen of 20 patients showed TM perforation within 6 weeks after the surgery. In the other two patients, perforation occurred at 3 months and 5 months after the surgery, respectively. After applying paper patch, 9 out of 14 patients (64.3%) showed closure of the perforation. None of 6 patients without any treatment (0%) had closure of the TM perforation. Fisher's exact test revealed statistically different closure rate between two groups ($p < 0.05$).

Conclusions: Paper patch can be used in the re-perforated TM after tympanoplasty, which is simple and effective procedure that can be done at the outpatient clinic. It showed statistically different closure rate from that of the re-perforated TM without treatment.

» **OTOP-78 14:30~14:40**

» Surgical outcomes in patients with the conductive hearing loss in normal tympanic membrane analysis of the cases without hearing gain

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Surgery, Samsung Medical Center, Sungkyunkwan
University School of Medicine, Seoul, Korea*

**Hokyung JIN, Young Sang CHO, Se Eun SON,
Won-Ho CHUNG**

Objectives: The purpose of this study was to analyze the hearing gain of Otosclerosis and Ossicular anomaly patients with conductive hearing loss according to the type and operation method performed by a single surgeon.

Methods: A retrospective study was performed which included 245 patients who had conductive hearing loss with normal tympanic membrane. We excluded patients who had otitis media or otorrhea history. Finally, 89 otosclerosis patients and 76 ossicular anomaly patients were included in the study. The ossicular anomaly group was classified as follows. Type 1) Stapes fixation only. Type 2) Stapes fixation with others ossicular malformation. Type 3) ossicular malformation with mobile stapes. Type 4) Aplasia or dysplasia of the oval or round window. The changes in hearing gain were evaluated by comparing the preoperative and postoperative pure tone audiometry.

Results: The age was significantly higher in otosclerosis group compared to congenital anomaly group. The postoperative air-bone gap was statistically significant improvement in otosclerosis patients compared to congenital ossicular anomaly group. However, when the ossicular anomaly group was analyzed by each type, the type 1 group with only stapes fixation showed a high hearing gain as in the otosclerosis patients, but the gain of type 2 or type 3 group with other ossicle anomaly was relatively decreased. The success rate of Otosclerosis and type 1 ossicular anomaly group was about 95%. However, the success rates of type 2 and type 3 ossicular anomaly groups

were 71% and 73%. There was no statistically significant difference in the postoperative ABG between primary and revision group in otosclerosis patients. But in the ossicular anomaly group, the revision cases showed less improvement in postoperative hearing than the primary cases.

Conclusions: The success rate according to hearing gain and post op ABG was statistically significant improvement in otosclerosis and type 1 ossicular anomaly groups compared to other groups.

» **OTOP-79 14:40~14:50**

» Handicaps of endoscopic ear surgery do they require a special surgeon to deal with? A review from the literature

Dep. of Otorhinolaryngology, Kasr Alainy Hosp., Cairo Univ.

Osama A. METWALY

Objectives: This review of the literature focus on those all handicaps associated with the usage of endoscopes in ear surgery by the newly trained physicians and provide solutions discussed in the literature.

Methods: Over the past decade, many studies have been published on the overall efficacy of endoscopic ear surgery as compared to the traditional microscopic approach, thus encouraging wider usage of the endoscope. Endoscopic ear surgery provides a wide panoramic view with easy observation of areas around the corners in the middle ear cavity decreasing residual disease and recurrence rates when compared to surgeries which used the microscope alone. Also, endoscopic techniques avoid having to make postauricular or endaural incisions.

Results: Those newly introduced techniques suffer from many handicaps including the inability to use both hands, potential risks of mechanical and thermal trauma and the difficult ability to manage bleeding within the field.

Conclusions: There is a noticeable continuous challenging learning curve with many handicaps for Endoscopic Ear Surgery. However, all of the discussed handicaps are

neglectable problems with experienced trained hands.

» **OTOP-80 14:50~15:00**

» Comparison of the efficacy of endoscopic and microscopic ear surgery in pediatric patients a systematic review and meta-analysis

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Sang-Yoon HAN¹, Doh Young LEE¹, Juyong CHUNG², Young Ho KIM¹

Objectives: To evaluate the efficacy of endoscopic ear surgery (EES) in pediatric patients, a systematic review and a meta-analysis of available literature were performed.

Methods: Studies reporting the comparative surgical outcomes of EES in pediatric patients were systematically reviewed by searching the MEDLINE, PubMed, and Embase databases for studies published from database inception through 2017. The selected articles included clinical studies conducted with at least 30 subjects and at least 1 postoperative parameter, including residual or recurrence of cholesteatoma and graft success in tympanoplasty. Two investigators independently reviewed all studies and extracted the data using a standardized form. A meta-analysis was performed using a random-effects model.

Results: Ten studies were identified as appropriate for quantitative meta-analysis and 19 studies for qualitative analysis. In the meta-analysis, residual or recurrence rate was significantly lower in EES than in microscopic ear surgery (MES) (OR 0.56, 95% confidence interval (CI), 0.38-0.84, $p=0.005$). In tympanoplasty, graft success rate was about the same between EES and MES groups. (OR 0.72, 95% CI, 0.41-1.26, $p=0.249$). In qualitative analysis, most of studies reported that audiological outcomes in tympanoplasty and success rate of cholesteatoma removal were similar between two groups.

Conclusions:EES being used in pediatric patients seems to be most beneficial for the complete removal of cholesteatoma.

OTOP XIV

RM 2-1 (Flamingo)

Chair : **Sung Il NAM, Gi Jung LIM**

Vestibular Disorder II

» **OTOP-81 15:20~15:30**

» Synchronous development of bilateral Meniere disease_ A poor prognostic indicator

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Jeon Mi LEE¹, Sung Hoon BAE², Sang Hyun KWAK², Jinsei JUNG², Sung Huhn KIM²

Objectives:Meniere's disease can progress to bilateral ears in 5-50% of patients. This study was performed to investigate the difference in the clinical features of metachronous and synchronous bilateral Meniere's disease.

Methods:Total 23 consecutive patients with definite bilateral Meniere's disease were enrolled. The patients were categorized into metachronous or synchronous bilateral Meniere's disease according to the disease transition period (<2 months: synchronous, >2 months: metachronous). Demographics, clinical features such as hearing and vestibular function, prognostic difference, and comorbidities (migraine, autoimmune disorder, familial Meniere's disease, and delayed hydrops) were analyzed and compared between two groups. Autoantibody levels and systemic inflammatory markers (ESR, CRP, and complements) were also analyzed.

Results:Of the 23 patients, 10 patients had metachronous

development and 13 patients had synchronous development of Meniere's disease. Age and gender distribution, hearing threshold, vestibular deficit, and the incidence of comorbidities were not significantly different between metachronous and synchronous Meniere's disease ($P>0.05$). However, the prognosis of synchronous Meniere's disease were significantly poorer than that of metachronous Meniere's disease ($p=0.012$). None of the synchronous Meniere's disease patients were categorized into group A and most of the patients were categorized into group C ($n=3$), D($n=6$), and E($n=4$), whereas most of the metachronous Meniere's disease patients were categorized into group A ($n=8$) according to the report guideline of AAO-HNS. The inflammatory and autoantibody markers were increased in 10 of 23 patients, but there was no difference in the levels of those markers between two groups ($P>0.05$).

Conclusions:Bilateral Meniere's disease with synchronous development showed poor prognosis when compared to that in the metachronous development. There might be different pathological mechanisms between two disease entities.

» **OTOP-82 15:30~15:40**

» Assessment of VFT results related to persistent nystagmus VN

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Sang Hyub KIM¹, Ji Eun CHOI², Jae Yun JUNG³, Min Young LEE⁴

Objectives:Vestibulopathy also known as vestibular neuritis (VN) is a benign disease, however there are patients whose nystagmus is still observed a month after onset of disease. The purpose of this study was to compare the difference between the patients who showed nystagmus even after one month, persistent nystagmus VN (PVN), from the onset of vestibulopathy and did not.

Methods:From January 2014 to July 2017, total 18 patients

with nystagmus one month after discharge were enrolled in the study group. The control group included 37 patients who were diagnosed as VN from January 2016 to July 2017 and does not meet the inclusion criteria. Demographic data of these two groups and initial VFT results were analyzed retrospectively.

Results:The mean age and hospitalization period of study group were 57.3 years, 6.4 days and control group were 49.9 years, 4.5days. SN degree was significantly higher in study group than control group. In the caloric test, 64.3% of study group (PVN) and 34.5% of control group showed abnormal findings, but there was no statistical difference, but in the chair test, there was significant difference in asymmetry, and phase. PVN showed lower gain, more asymmetry and phase lead. In the v- HIT results, 90.9% of study group (PVN), 55.6% of control group showed abnormal findings in lateral canal, and 63.6% of study group (PVN), 22.2% of control group showed abnormal findings in posterior canal, and there were significant differences.

Conclusions:In the case of PNV patients, both superior and inferior vestibular nerve damages are expected. Closed and longer observation of the patients with lower gain, higher deviation of asymmetry in chair test; lower gain in both lateral and posterior canal in vHIT test is recommended.

» **OTOP-83 15:40~15:50**

» Benign paroxysmal positional vertigo (BPPV) after otologic surgery

Soree Ear Clinic

Seong-Cheon BAE, You-Ree SHIN, Kyung Ray MOON, Hye Jin LIM, Kwang Sun LEE, Chong-Sun KIM, Young-Myoung CHUN

Objectives:After otologic surgery, iatrogenic BPPV patients were observed occasionally. To find a incidence, clinical feature and relation of postoperative bone conduction threshold change of otologic surgery induced BPPV, we reviewed our postoperative video nystagmography and

audiogram after otologic surgery.

Methods:We reviewed 723 patients of otologic surgery. All patients checked video nystagmography and bone conduction audiogram at 1 day after surgery. Otologic surgery was included intact canal wall mastoidectomy(397 cases), canal wall down mastoidectomy(147 cases), stapedotomy(63 cases), atresia repair surgery(58 cases) and cochlear implant surgery(CI)(58 cases)

Results:Incidence of iatrogenic BPPV was 3.5%(25 of 723) in total, 12.7%(8 of 63) in stapedotomy, 12.1%(7 of 58) in CI, 1.8%(7 of 397) in intact canal wall mastoidectomy, 1.7%(1 of 58) in atresia repair surgery and 1.4%(2 of 147) in canal wall down mastoidectomy. Postoperative bone conduction threshold increase was showed significantly in BPPV group (0.78 ± 8.79 dB in non-BPPV group, 2.78 ± 4.90 dB in BPPV group).

Conclusions:Stapedotomy and CI showed more frequent incidence of postoperative BPPV. And in BPPV group, there were more postoperative bone conduction threshold increases than non - BPPV group. So, otologic surgeon should have attention for careful surgery and postoperative BPPV.

» **OTOP-84 15:50~16:00**

» Clinical features of posttraumatic benign paroxysmal positional vertigo and analysis of factors affecting its severity and resolution

Department of Otolaryngology, Ajou University School of Medicine

Hantai KIM, Oak-Sung CHOO, Jeong Hun JANG, Hun Yi PARK, Yun-Hoon CHOUNG

Objectives:Trauma is regarded as a cause of benign paroxysmal positional vertigo (BPPV). In this study, we described clinical features of traumatic BPPV (t-BPPV), comparing them with those of other traumatic vertigo. Besides, we classified patients with t-BPPV according to their severity – mild (typical BPPV) and severe (bilateral, recurrent, or persistent) types, investigating the factors

affecting the severity and resolution rate of t-BPPV.

Methods:The medical records of 74 patients who were diagnosed with posttraumatic vertigo at the Dizziness Clinic in Ajou University Hospital between 2011 and 2017. All of them were referred for consultation as vertigo/dizziness after trauma from the Trauma Center in the same hospital. Basic demographics, types of trauma, characteristics of vertigo, duration of hospitalization, and the period between the accident and the first consultation were retrospectively reviewed. BPPV were categorized by mild type (typical BPPV) and severe type (bilateral, recurrent, or persistent BPPV).

Results:Among the 74 patients with posttraumatic vertigo, 41 (55.4%) were diagnosed with BPPV. There was no difference of clinical features between t-BPPV and other traumatic vertigo. Of 41 patients with t-BPPV, 17 (41.4%) were mild and 24 (58.5%) were severe type t-BPPV. 'Fall down' and 'out car traffic accident (TA)' were more frequent in the severe type, while 'in car TA' and 'slip down' were more common in the mild type t-BPPV ($p=0.009$). The duration of hospitalization and the period until the first consultation were longer in the severe type ($p=0.006$ and $p=0.021$, respectively). Prognosis both at 1- and 3-month was better in the mild t-BPPV patients.

Conclusions:It was truly impossible to distinguish BPPV by only clinical features of dizziness without more accurate diagnostic tools, such as video nystagmography. Consultation with otologist may be helpful to diagnose and manage t-BPPV. Early diagnosis and prompt repositioning maneuver would contribute to the resolution of t-BPPV.

» **OTOP-85 16:00~16:10**

» Risk factors of canal conversion in benign paroxysmal positional vertigo

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Geonho LEE¹, Kwanho KIM¹, Yongho PARK¹,

Sungjun CHOI², Jinwoong CHOI¹

Objectives:The purposes of this study were to investigate the incidence of canal conversion in benign paroxysmal positional vertigo (BPPV) and to analyze the risk factors of the canal conversion.

Methods:We retrospectively reviewed medical chart in 2450 patients diagnosed with BPPV from March 2012 to December 2017. The following parameters were analyzed in patients with (canal conversion group) and without canal conversion (non-canal conversion group) after canalith repositioning procedure (CRP) for treatment: demographics including age and sex, etiology, side and type of semicircular canal involved, and type and number of CRP.

Results:Canal conversion occurred in 68 of total 2450 patients (2.7%). Canal conversion occurred more commonly in the lateral semicircular canal (LSC) than in the posterior semicircular canal (PSC), which was statistically significant ($P = 0.004$). In addition, secondary BPPV and BPPV with multiple CRP showed more canal conversion compared to primary BPPV and BPPV with single CRP, respectively ($P = 0.003$, $P = 0.003$). Especially, in case of LSC conversion, patients treated with Gufoni maneuver experienced more canal conversion compared to those treated with Barbecue maneuver ($P=0.007$).

Conclusions:Canal conversion can occur in approximately 2.7% of BPPV patients. The canal conversion is more common in the LSC than in the PSC. In addition, secondary BPPV and multiple CRP are considered as risk factors for canal conversion.

» **OTOP-86 16:10~16:20**

» Combined central and peripheral vestibulopathy in superficial siderosis

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**Sang-Yeon LEE¹, Dong Han LEE¹, Yun Jeong
BAE², Jae-Jin SONG¹, Ji Soo KIM^{3*},
Ja-Won KOO^{1*}**

Objectives:To report the clinical course, cochleovestibular status, and patterns of vestibulopathy during follow-up of a relatively large case series, and to discuss the possible pathophysiological mechanism of vestibular deterioration in subjects with superficial siderosis (SS).

Methods:Six patients diagnosed with SS by magnetic resonance imaging (MRI) were enrolled. Their medical records and radiological findings were retrospectively reviewed, particularly in terms of progression of the vestibulocochlear manifestations and the radiological characteristics.

Results:All six patients presented sensorineural hearing loss (SNHL). Five of them exhibited progressive hearing loss over years, which was asymmetric in four. On their most recent evaluations, patients showed cerebellar ataxia with combined central and peripheral vestibulopathy on both sides (n=4), a bilateral peripheral vestibulopathy (n=1) or isolated central vestibulopathy (n=1). Notably, the former four patients showed an evolution of isolated central vestibulopathy into combined central and peripheral vestibulopathy. Hypo-intense lesions on T2 weighted MRIs were evident around the cerebellum in all patients, but such lesions were observed around the brainstem in five and the CN VIII in four. The cochlea-vestibular dysfunction generally progressed asymmetrically, but no left-right asymmetry was evident on MRI.

Conclusions:SS typically presents as bilaterally asymmetric, progressive cochleovestibular dysfunction with cerebellar ataxia. The pattern of vestibular dysfunction is usually combined central and peripheral vestibulopathy on both sides. Thus, precise identification of audiovestibular dysfunction and central signs is essential in SS, and patients with SS should undergo regular, comprehensive neurotological evaluation to optimize their treatments and prognosis.

» **OTOP-87 16:20~16:30**

» Quantitative measurement of endolymphatic hydrops is more accurate than the conventional qualitative method

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**Tae-Soo NOH¹, In Chan SONG², Jeong-Sug
KYONG¹, Moo Kyun PARK¹, Jun Ho LEE¹, Seung
Ha OH¹, Myung-Whan SUH¹**

Objectives:This study was performed to quantitatively evaluate the degree of hydrops by gadolinium-enhanced endolymphatic hydrops magnetic resonance imaging (EHI) in Meniere's disease (MD). We also aimed to correlate the degree of EHI with the vestibular function test, pure tone audiometry outcomes, and clinical factors.

Methods:Thirteen unilateral hearing loss MD patients underwent gadolinium-enhanced endolymphatic hydrops magnetic resonance imaging (EHI). Clear EHI was acquired in 12 subjects. The quantitative volume of the (Endolymph)/(Endo+Perilymph) ratio was calculated by an automated 3D image analysis software. To analyze the correlations between endolymphatic hydrops imaging, clinical parameters and vestibular function test results including caloric test, Vestibular Evoked Myogenic Potentials (VEMP), Videonystagmography (VNG) were evaluated.

Results:The gender (M:F = 5:7), age (47.67±8.61 yrs), and duration of illness (57.17±72.63 mo) were similar to the previous reports. The relative volume of the endolymph was always larger in the pathologic size (46.5±9.7%) when compared to the normal side (35.3±7.7%). There was no exception in all 12 patients, and the relative volume of the pathologic side was significantly larger in every case. The caloric test CP value and hearing threshold showed a good correlation with the relative endolymph volume

of the pathologic side. The asymmetry ratio (AR) and bilateral difference (BD) was also correlated with the ratio and difference of the relative endolymph volume. The duration of illness had a good correlation with the extent of vestibular hydrops. When compared to the former studies that used a qualitative grading of the endolymphatic hydrops, the results were better in this study.

Conclusions:Quantitative measurement of high resolution hydrops MRI of the inner ear can provide clinically valuable information of MD. It can accurately point out the pathologic side with very high sensitivity and specificity (100% and 100% in this study). It may also visualize the pathophysiology of unilateral sensorineural hearing loss and abnormal caloric test results outcome in MD patients. Quantitative measurement EHI may provide more accurate information than the conventional qualitative method.

» **OTOP-88 16:30~16:40**

» Intratympanic steroid treatment versus intratympanic steroid and diuretics combination treatment in patients with acute low frequency sensorineural hearing loss with vertigo

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Hyeon Sik OH, Hyun Joon SHIM, Yong-Hwi AN

Objectives:Intratympanic dexamethasone (ITD) is a standard treatment for patients with sudden sensorineural hearing loss. The aim of this study was to evaluate the effectiveness of ITD vs. combination of ITD and diuretics for acute low frequency sensorineural hearing loss (LFHL) with vertigo.

Methods:A total 31 patients with LFHL that had developed within previous 2 weeks were enrolled and categorized into two groups: treated with ITD four times on 4 consecutive days (ITD group; 17 patients) and treated with ITD in the same way and diuretics orally for 2 weeks (combination group; 14 patients). After 6 months, we analyzed treatment

outcomes using subjective improvement and audiometric change.

Results:Hearing thresholds at low frequencies ≤ 500 Hz were significantly improved in both ITD only and combination group ($p < 0.05$). The cure rate of combination group was not significantly higher than that of ITD only group (57.1% vs. 52.9%, $p > 0.05$). For subjective symptoms, there were no significant differences of improvement rate in both groups (combination 64.3% vs. ITD only 64.7%, $p > 0.05$). In pure tone audiometry, the improvement rate of combination group was not significantly different from that of ITD only group (71.4% vs. 76.5%, $p > 0.05$). There was a significant correlation between the complete recovery rate and duration of symptoms.

Conclusions:ITD alone is an effective treatment modality for acute LFHL with vertigo within 2 weeks of development. Combined ITD and diuretics have no additive effect for the recovery of hearing in patients with LFHL.

» **OTOP-89 16:40~16:50**

» Application of virtual reality-immersion in postural control assessment

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Kyung Jin ROH¹, Inon KIM², Ji Hyung KIM², Min Pyo HONG², Eun Jin SON²

Objectives:To maintain posture, the visual, vestibular and proprioceptive sensory information are utilized. In dizziness patients, posturography is used to measure variations in center of gravity(COG) to assess postural instability. The VR technology can be applied to create real-life 3D environments where the user can navigate. In this study, we introduce the development of VR immersion contents with varying degrees of visual sway components, and evaluate

their validity in assessment of postural control.

Methods: Three conditions of VR immersion scenarios (VR1-3) were created and operated on commercially available head mount devices. Ten healthy subjects were instructed to maintain upright posture during exposure to different visual conditions. Posturography data of COG sway during test trials of 30 seconds were collected. Subjective symptoms were measured using visual analog scale and the simulator sickness questionnaire.

Results: Mean COG sway velocities were 0.17 ± 0.38 deg/sec and -1.51 ± 0.86 for x- and y-axis directions for VR1, 0.24 ± 0.52 and -1.88 ± 0.75 for VR2, and 0.11 ± 0.53 , and -1.94 ± 0.68 for VR3. Mean VAS scores 0.1 ± 0.32 , 0.4 ± 1.27 , and 2.0 ± 3.09 for VR1-3 respectively. Mean total SSQ scores were 0.37 ± 1.18 , 1.5 ± 4.73 , and 7.48 ± 11.56 for VR1-3, showing that even healthy subjects showed wide range of VAS and SSQ during VR immersion. **Conclusions:** Tailored VR immersion scenarios were developed and their applications in assessment of posture control showed that increased visual-vestibular conflict resulted in postural instability. Addition of VR immersion conditions would be helpful to discern minute but significant deficits in patients who experience dizziness but can perform conventional posturography tasks.

RHKL III

RM 4-2 (Convention B)

Chair : Sang Hag LEE

Keynote Lecture

» **10:40~11:10**

» **Nasal irrigation and instrumentations in maxillary antrostomies**

Hospital Putrajaya

Revadi GOVINDARAJU

The complex three-dimensional shape of the maxillary sinus is a challenge to any endoscopic surgeon when addressing pathologies specifically in those areas out of reach during routine surgery. The position of the maxillary antrostomy in the sagittal plane and the dimension of the sinus does not make it easy for instrumentation in particular to the medial, anterior and alveolar recess and increases requirements for angled instruments. Despite using angled forceps and shavers, often surgeon still struggle with instrumentation of the maxillary sinus. Traditionally, further access was achieved via Caldwell Luc approach or by means of more radical procedures such as medial maxillectomy. These procedures gave way to more mucosal- preserving surgeries described recently. The choice of technique determined by the site of disease, nature of pathology and the post-operative care required. Nasal irrigation is an integral part of post-operative care and the extent of penetration of the irrigation fluid has been studied both in humans and cadavers using varying delivery methods, head positions and simulated models. This aspect was revisited in a cadaveric study performed to look at the optimal head position and volume of irrigation specifically for different maxillary antrostomies including the recently described mega-antrostomies. The study showed no differences in the different head positions to achieve good irrigation

but a high volume appeared essential for good irrigation penetration. In the same study fungal debris simulation was performed and instruments and irrigation were used to remove debris. Sites with residual debris were used as a measure to assess the accessibility of the different maxillary walls in the different antrostomies and the suitability of the approaches

RHSP IV

RM 4-2 (Convention B)

Chair : Sung Wan KIM, Sourabha K PATRO

Recent Advances in Obstructive Sleep Apnea

» **08:50-09:10**

» Phenotyping of OSA

Seoul National University College of Medicine

Hyun Jik KIM

Introduction: Obstructive sleep apnea (OSA) is a chronic and heterogeneous disorder that leads to early mortality, stroke, and cardiovascular disease. OSA is defined by the apnea-hypopnea index, which is an index of OSA severity that combines apneas (pauses in breathing) and hypopneas (partial obstructions in breathing) associated with hypoxemia. Yet, other sleep metrics (i.e., oxygen nadir, arousal frequency), along with clinical symptoms and molecular markers could be better predictors of stroke and cardiovascular disease outcomes in OSA. The recent focus on personalized medical care introduces the possibility of a unique approach to the treatment of OSA based on its phenotypes, defined by pathophysiological mechanisms and/or clinical presentation. The OSA phenotypes were divided across three different domains (1) clinical symptoms (i.e., daytime sleepiness), (2) genetic/molecular markers, and (3) experimental data-driven approach (e.g., cluster analysis). Finally, we further highlight gaps in the literature framing a research agenda. OSA phenotyping and its direction Clinically-defined phenotypes / Molecular genetics / Experimental-analytical studies - Gender-specific differences in symptoms / Differences in comorbid diseases of OSA - The importance of phenotyping OSA patients, particularly in the context of OSA treatment, - Consensus on detailed principles for OSA phenotyping : critical steps in the treatment of OSA and prediction of prognosis - Phenotyping to functional (neurocognitive,

respiratory control) or structural characteristics. : The conventional image of OSA patient / dominant phenotype in clinical practice - The clinical characteristics (ESS score, subjective sleep duration and sleep latency, related diseases) for phenotyping patients: available to clinicians treating patients with OSA. Association between phenotypes and comorbidities in OSA - The comorbidities in OSA : Cardiovascular disease, metabolic syndrome (DM), Respiratory diseases, Cognitive diseases - The most common clinical phenotype (OSA subtype) was the patient with OSA and excessive sleepiness (EDS). In most studies, the patient with OSA and EDS had increased hypertension, inflammatory markers, and cardiovascular comorbidities. 1) OSA patients with significant EDS: Younger and had more severe OSA 2) OSA patients with EDS phenotype had the lowest prevalence of cardiovascular disease 3) OSA patients reporting difficulty in initiating and/or maintaining sleep : more frequently had cardiovascular, pulmonary and/or psychiatric comorbidities. 4) High prevalence of comorbidities in the cluster of the obese elderly OSA patients 5) High prevalence of comorbidity among the obese middle-aged symptomatic OSA patients. Clinical implications of OSA phenotypes 1) OSA can occur in a wide range of “non-traditional” presentations. 2) This observation serves to alert primary health care providers to the possibility of OSA in subgroups of slim patients, non-sleepy short-sleepers, and women. 3) Improved classification of phenotypes is warranted in order to better distinguished OSA phenotypes 4) The differences in phenotypes might lead to an improvement in clinical practice for treatment to the specific phenotype. 5) Treatment effects on outcomes are likely to differ considerably depending on OSA phenotype.

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» 09:10-09:30

» The usefulness of DISE in the treatment of OSAS

Department of Otorhinolaryngology Head-Neck Surgery, Busan Saint Marys Hospital, Busan, Korea

Soo-Kweon KOO

Croft and Pringle described 'sleep nasoendoscopy' in 1991 as an endoscopic evaluation of the upper airway during sedation. It was developed in multiple centers throughout Europe and is now widely performed. Although DISE has some limitations such as a limited period of observation and multiple classification systems, it approaches the natural physiologic state of sleep more than currently available diagnostic tools. The most important thing in the treatment of sleep apnea is accurate location of the obstruction. In this sense, the diagnostic technique for diagnosing the obstruction site in the actual sleep state is very important. DISE offers a unique structure-based assessment of the airway, compared with other commonly used evaluation techniques and it is used in the clinical practice not only to locate obstructions, but as an aid in surgical decision-making. DISE determines the treatment method by diagnosing the obstruction site, degree and pattern of obstruction in patients with sleep apnea. It is also useful for evaluating treatment outcomes such as surgery or MAD and is recently used for CPAP titration. I would like to introduce the clinical usefulness of DISE together with several studies and cases.

» 09:30-09:50

» Gastroesophageal reflux disease and obstructive sleep apnea

Division of Gastroenterology, Department of Internal

*Medicine, College of Medicine, St Pauls hospital, The
Catholic University of Korea, Seoul, Korea*

Jung-Hwan OH

Gastroesophageal reflux disease (GERD) is prevalent in Asia as well as in Western countries. Sleep disturbance and breathing disorders during sleep are becoming increasingly prevalent, and they are commonly associated with GERD. Obstructive sleep apnea (OSA) is the most common form of sleep-disordered breathing. Individuals with OSA often have frequent typical symptoms of gastroesophageal reflux disease (GERD). The prevalence of symptom-based GERD in OSA proven by PSG ranges from 25% to 39%, which is higher than that of the general population. Is there any causal relationship between GERD and OSA? The relationship between GERD and OSA is still questionable, and it might be still bidirectional. One explanation is that obesity and GERD have similar risk factors, which is not very relevant. Other explanations assert that GER is an important factor causing OSA. Patients with night-time heartburn had significantly more sleep-related reflux events. OSA and night time symptoms could be strongly related. This review discusses the following: the epidemiology of GERD in OSA patients; the causative relationship between GERD and OSA, even though it remains an area of controversy; and the possible role of night time GER symptoms in patients with OSA.

» **09:50-10:10**

» Office based therapy in OSAS (radio frequency ablation with lifestyle therapy): Impact on quality of life, disease progression and health care costs

*Assistant Professor, Dep. of Otolaryngology and
Head and Neck Surgery, All India Institute of Medical
Sciences (AIIMS), JODHPUR*

Sourabha Kumar PATRO

Introduction: Radio-frequency ablation (RFA) and life style changes are novel, minimally invasive, cost-effective

modality for treatment of mild to moderate OSAS.

Methods: 16 patients of diagnosed OSAS underwent radiofrequency ablation of soft palate and base tongue as warranted in DISE and f/b advised life style modifications for 3 months. Snoring frequency, intensity, Epworth daytime sleepiness, sleep questionnaire and polysomnography were evaluation parameters. Results were compared with 15 cases of diagnosed OSAS with only lifestyle modification.

Results: Improvement in snoring intensity, apnoea, ESS scores, minimum oxygen saturation, time duration of Sao2 < 90% and arousal index were significantly more in the study group compared to the control group, though there was significant reduction from the pre-treatment values in both the groups. There is evidence in literature with various non-invasive techniques such as exercises, implants, CPAP and various office based procedures. However, with the combination of RFA there is significant better outcome with significant reduction of health care costs by avoiding surgical and CPAP related costs for severe OSAS.

Conclusion: We, evidenced by the present study and literature, propose pivotal role of office based radio-frequency ablation for severe OSAS in significantly improving the outcome and altering disease progression along with avoiding high health care costs of surgery, in-hospital treatment and CPAP over and above the results achieved with life style modification alone. Further follow up and studies with larger sample size will validate the results to form an established institutional/definitive treatment protocol.

RHSP V

RM 4-2 (Convention B)

Chair : Sang Hag LEE, Xiangdong WANG

**What a Precision Medicine Means and It's
Application for Rhinologic Field**

» 11:10-11:30

» Precision medicine in oncology

Department of Internal Medicine, Korea University

Kyong Hwa PARK

Concept of precision medicine is a new approach for disease treatment and prevention that takes into account individual variability in genes, environment, and lifestyle in each person. Although the concept has long been a part of healthcare, recent technological and analytical advances in genomics rapidly brought chances for active clinical application. The oncology field has been a pioneer in precision medicine. The move towards personalized care has been driven by unmet clinical needs from toxicities due to 'one-size-fits-all' approach cancer drugs. The recent revolutionized approach has been enabled by armamentarium of new drugs and an array of molecular targets. More precise approach using targeted agents and/or immunotherapies are used based on the information from tumor and blood samples after the integrative analysis of DNA, RNA, and protein. To establish definitive evidence supporting precision approach in oncology, properly conducted clinical trials are essential for precision drug use and diagnostics. Therefore, genetic assays to detect molecular alterations and identify gene expression profiles should be validated. Then, the results from clinical trials for diagnostics and treatment should improve clinical outcomes to be implemented to treatment recommendations. Thus, clinical trials has been transformed from the population-based studies to define treatments for average patients into biomarker-driven trials to identify the best treatment for individual patients. In clinical practice, application

of precision oncology by sequencing gene panels, as well as RNA sequencing or genome sequencing has been recently launched. Although initial focus was on well-validated targeted sequencing data, broader panels of cancer-associated genes are included nowadays. Although the NGS-based precision oncology approach is rapidly spreading in Korea thanks to reimbursement by medical insurance in several cancer types, establishment of analytical setup and operational workflow are still challenging in each institution. Korean government has recently launched K-MASTER program to accelerate precision oncology. K-MASTER will support targeted genetic sequencing for 10,000 Korean patients with treatment-refractory solid cancers. Through the clinical trials in this program, we expect to find new signals for cancer treatment in the future.

» 11:30-11:50

» New genomic era for precision medicine

*ASAN Institute for Life Sciences, ASAN Medical
Center, Department of Convergence Medicine,
University of Ulsan College of Medicine*

Yun-Yong PARK

Genome wide data-based on biology and medicine enable to diagnose patient and shift paradigm of classical treatment of patient. The advance in the high-throughput sequencing (next-generation sequencing, NGS) technology is a new way to study various biological and medical issues. RNA-sequencing among various NGS techniques has been widely used to measure gene expression and RNA-alteration since detecting gene expression level of genes-related to clinical outcome has been used for patient diagnosis and enable to discriminate the patients. While RNA-Seq application to medicine is emerging technology, its understanding in medical field has limitation in the field. In the session, I will present what genome wide study is and how researchers including clinician efficiently use this technology and discuss therapeutically how we can use genomic data for

developing target drugs.

» 11:50-12:10

» Deep sequencing of the antibody repertoire

Department of Biological Sciences, Ajou University

Daechan PARK

The advent of next-generation sequencing (NGS) technologies has transformed the fields of genomics and allowed us to determine antibody repertoires at an unprecedented depth. In this talk, I will present the bioinformatics approaches that employed NGS for investigating antibody repertoire. First, I will introduce the high-throughput sequencing coupled with mass spectrometry of serological antibodies. This proteogenomic approach allowed us to quantitatively characterize the influenza-specific serological antibody repertoire in four healthy donors following 2011-2012 seasonal flu vaccination and subsequently determined the biochemical and functional properties of prevalent serum antibodies. The repertoire analyses revealed that boosting of the antibodies pre-existing prior to vaccination accounted for ~60% of the vaccine response, indicating the substantial degree of antibody response being biased by the antibodies that were already existing prior to vaccination. Second, I will discuss antibody sequencing to determine the naïve and antigen-experienced repertoires of healthy human donors. The use of a recently-developed large-scale experimental method for pairing heavy and light chain variable regions allowed us to identify antibody clusters from single naïve B cells and single antigen-experienced B cells. Statistical analysis and simulation revealed that heavy and light V-gene sequences pair in a combinatorial fashion without detectable pairing restrictions at the population level. These two approaches for B-cell repertoire will provide an advance in studying antibody responses to disease or to vaccination, aiding the development of therapeutic antibodies.

» 12:10-12:30

» Precision medicine in rhinologic field

*Otolaryngology Head and Neck Surgery Department,
Beijing Tongren Hospital, Capital Medical University*

Xiangdong WANG

Clinical medicine has entered the era of precision medicine, establishment of the endotypes of chronic rhinosinusitis (CRS) based on the pathogenesis and using target therapy are the direction of research and clinical practice. Till now, the diagnosis and treatment are based on the phenotypes of CRS without nasal polyps (CRSsNP) and CRS with nasal polyps (CRSwNP), and the therapeutic strategy consists of nasal steroids and sometimes oral steroids, and endoscopic surgery. Some studies have reported the endotypes of CRS based on inflammatory cytokines and clinical parameters with cluster analysis. These endotypes will be helpful for establishing new classification of CRS and direct target therapy as the standards of provision medicine. In this presentation, the recent progress of precision medicine and its preliminary application in chronic rhinosinusitis is reviewed, in order to be helpful for the study and clinical practice of chronic rhinosinusitis in future.

RHSP VI

RM 4-2 (Convention B)

Chair : Hwan-Jung ROH, Joseph HAN

Tumor and Skullbase Surgery

» 13:30~13:50

» New technologies in endoscopic skull base surgery

Eastern Virginia Medical School

Joseph HAN

This presentation will discuss the progression and modification of operating room instrumentation for endoscopic skull base surgery that have occurred over the past 15 years. The presentations will discuss endoscopic instruments that have been for improved visualization and radiographic imaging for skull base lesions. Technology that has been utilized for improved hemostasis and resection will also be discussed. Instrumentation used in the reconstruction of the skull base defect after removal of the lesion will be examined. Possible future development of new technology for skull base procedures will be discussed.

» 13:50~14:10

» Challenges in endoscopic skull base surgery draf and trans-cribriform approach

*Department of Otorhinolaryngology-HNS, Seoul
National University Hospital, Seoul, Korea*

Tae-Bin WON

Approaches to the frontal sinus continues to be a challenge in rhinology due to the highly variable anatomy, difficult visualization, and a predilection to stenosis. The surgical options range from a very limited opening of the anterior ethmoid to bilateral transseptal openings of the frontal sinus. A classification system for endonasal frontal sinus

surgery has been developed by Wolfgang Draf. Draf 3, AKA, endonasal median drainage, provides a common median drainage pathway for bilateral frontal sinuses from orbit to orbit. The anterior skull base, in front of the sphenoid sinus, can be approached using a variety of techniques including extended subfrontal, transfacial, and craniofacial approaches. Advances in instrumentation, enhanced understanding of the surgical anatomy and reconstructive techniques have led to the development and popularization of endoscopic endonasal approaches (EEA) for exposure and resection of anterior skull base lesions. This minimal access surgery has proven to be a feasible alternative to the traditional open approaches with comparable or even better surgical outcomes. In this presentation, surgical tips for the Draf 3 procedure and the endoscopic transcribriform approach will be discussed together with representative cases and outcomes.

» 14:10~14:30

» Principles of endoscopic skull base reconstruction

*Department of Otorhinolaryngology-Head and
Neck Surgery, Sungkyunkwan University School of
Medicine, Samsung Medical Center*

Sang Duk HONG

Extended endoscopic skull base surgery has become popular, resulting in larger and more complex defects, which are difficult to reconstruct. When Surgeon plans reconstruction, there are a number of things to consider. 1) Etiology of defect; 2) Size of defect; 3) Pressure of CSF; and 4) Risk factors for impaired healing such as history of radiation therapy. When we repair the spontaneous leak such as meningocele, increased intracranial pressure must be properly considered and managed. Although larger defect is more difficult to reconstruct, more important factor of failed reconstruction is the higher pressure of CSF. Although there are no consistent criteria to determine the CSF flow rate, it is generally accepted that high flow CSF

leak is encountered when there are direct communication between defect and cisterns or ventricle. Therefore, when surgeon plans to operate the craniopharyngioma or intradural chordoma that always connected to cistern, more rigorous reconstruction strategies needed. (ex, multilayered reconstruction with rigid buttress, Lumbar drainage) Several reconstructive techniques and materials have been introduced. Fascial grafts (usually double layered), fat grafts, rigid buttress with bone/cartilage, mucosal graft and pedicled vascularized flap had been used. Since multilayered reconstruction with nasoseptal flap (NSF) was introduced, postoperative CSF leak have been significantly reduced. However, The CSF leak rate (1%~15%) still can not be ignored especially in extended skullbase surgery other than pituitary surgery. When analyzing the causes of reconstruction failure, The major cause of postoperative CSF leak was dead space between flap and skull base. It was induced by hematoma, bony ridge and inappropriate bolstering. The prevalence of CSF leak decreased as time went on and these indicates the importance of "learning curves". Based on the causes of CSF leak, several skills for flap reconstruction are important to prevent the poor outcomes of skull base surgery; (1) adequate preparation of recipient bed by removal bony ridge and complete mucosal striping (2) proper pressure to NSF from proximal to distal (3) proper size of NSF and (4) sufficient vascularity with proper pedicle. In this symposium, various examples of endoscopic skullbase reconstructions will be introduced.

» 14:30~14:50

» VR-based training program for endoscopic skull base surgery

Department of Otolaryngology-Head and Neck Surgery, Seoul St Marys Hospital, College of Medicine, The Catholic University of Korea
Do Hyun KIM

After introducing endoscope in the paranasal sinus and skull base surgery, endoscopic surgery has been extended

indication, because minimal invasive surgical techniques has reduced postoperative symptoms, complications and enhanced patients' quality of life. However, it is required a new anatomical comprehension including familiarity with important landmarks, a high level of endoscopic instrument manipulation skill including avoid instrument tangle in narrow space, for excellent surgical outcome via endoscopic endonasal intervention. Especially in the skull base surgery, carotid artery or other vascular injury can be maiming or fatal, and cranial nerve injury may be resulting catastrophic disability. Therefore, although residents were trained to conduct the endoscopic surgery under close supervision in operation room, many critical procedures were usually still performed by the attending surgeon. Cadaver training is a viable option for teaching such skills, when available. Sensory feedback from cadaver bone remains largely unchanged from live tissue, and the anatomy remains intact. Also, cadavers are expensive and require specialized equipment, staff, and facilities. Alternatively, a number of virtual reality simulators are available for skullbase surgery, but they often lack realistic drilling haptics, and the initial costs could be high. Therefore, we have been developing a new virtual simulator and contents for endoscopic sinus and skull base surgery with various techniques of match-moving, 3D reconstruction and simulation, and innovative virtual reality devices.

Acknowledgments: This work was supported by Institute for Information & communications Technology Promotion(IITP) grant funded by the Korea government(MSIT) (No. 2017-0-01786, VR/AR/MR based simulation system & contents development for medical practice using haptic and sensing technology) and by 'Virtual Reality Industry Development Program', through the Ministry of Science and ICT (D0205-17-1024).

RHSP VII

RM 4-2 (Convention B)

Chair : Soo Whan KIM, Heung Man LEE

New Horizon in Allergic Rhinitis

» 15:20~15:40

» The role of epithelium in pathophysiology of allergic rhinitis

*Department of Otorhinolaryngology-Head and Neck
Surgery, Asan Medical Center, University of Ulsan
College of Medicine, Seoul, Republic of Korea*
Ji Heui KIM

The nasal airway epithelium forms the first physiological barrier against invasion to pathogen entry and allergen infiltration. In addition to their physical protective role, airway epithelial cells regulate both innate and adaptive immunity through production of cytokines and chemokines and physical interactions with immune cells. Thus, dysfunctional epithelium plays an important role in the pathogenesis of the allergic inflammatory responses. A better understanding of the role of epithelium in pathophysiology of allergic rhinitis may provide important knowledge for the prevention of allergic rhinitis as well as the development of future treatments.

» 15:40~16:00

» Recent update in management of allergic rhinitis

*Department of Otorhinolaryngology, Dankook
University College of Medicine*
Ji-Hun MO

Allergic rhinitis is one of the most prevalent diseases and causes lots of economic burdens. The treatment of allergic rhinitis can be classified into avoidance, pharmacotherapy and immunotherapy. Recently, several guidelines on

allergic rhinitis were updated and recommend changes in pharmacotherapy, especially in oral H₁-antihistamines, intranasal H₁-antihistamines, intranasal corticosteroids, and leukotriene receptor antagonists either alone or in combination. In addition, in sublingual immunotherapy, new tablet forms were introduced in our country. In this symposium, recent changes in management of allergic rhinitis will be discussed in detail.

» 16:00~16:20

» Hygiene vs. Microbiome theory in allergic airway diseases

*Department of Otorhinolaryngology, The Catholic
University of Korea*
Soo Whan KIM

The last few decades have seen a dramatic increase in the global prevalence of allergic diseases. This has been specially apparent in the western world, although similar increases have been observed in low-income countries. The reasons for this increase have not been entirely clear. 'The hygiene hypothesis' has been proposed to explain this increase. The original 'hygiene hypothesis' was prompted by evidence that overcrowding, unhygienic conditions and larger family size were associated with a lower prevalence of atopy, eczema, hay fever and asthma. Moreover, recent studies reveal the diversity of the microbiome is also an important factor. Changes in living environment, diet, lifestyle and weight heavily influence the composition and diversity of the microbiome in the gut and skin. And, Allergen cross-reactive antibodies directed to selected microbes of the gut and lung microbiome have also been described recently. Also, there have also been attempts to determine the cause of microbiome dysbiosis through an immunologic study using Treg cell and Dendritic cells. Recently, the study of the control of barrier epithelial cells can affect type 2 immunity causing allergic disease. It is unlikely that Hygiene theory can account for all recent trends in allergic diseases. But it is significant to discuss the different points of view

here.

be familiar with an armamentarium of minimally invasive procedures.

» **16:20~16:40**

» In-office procedures in allergic rhinitis

*Dep. of Otolaryngology, Univ. of Alabama at
Birmingham*

Do-Yeon CHO

Allergic rhinitis is a very common disorder that affects millions of patients annually and the hallmark complaint of nasal obstruction significantly impacts the quality of life. Many surgical options exist for the treatment of allergic rhinitis, directed primarily at the underlying nasal obstructive component and drainage. The purpose of this presentation is to highlight and discuss the various surgical modalities and their historical efficacy which can be done in-office. Treatments have focused on reduction of the inferior turbinate for symptomatic improvement in patients afflicted with allergic rhinitis, such as topical steroid spray, turbinate reduction using Coblator or Celon probes. Endoscopic posterior nasal nerve (PNN) resection has been described as an efficacious surgical treatment of allergic and nonallergic rhinitis, but the requirement for surgery under general anesthesia has limited its acceptance. Patients with chronic rhinitis can now be treated using a novel device designed for office-based cryosurgical ablation of the PNN. Office-based cryotherapy of the PNN region is safe and well tolerated. This will be reviewed with cadaver dissection videos. In addition, in-office polypectomy or mucosa reduction will also be reviewed during the presentation. A simple and safe office-based polypectomy device to debulk nasal polyps allows immediate alleviation of nasal obstruction and better access for topical medications. The vacuum-powered microdebrider is a safe, effective, and well-tolerated instrument to resect nonfibrous nasal polyps in the outpatient setting. As no single modality has evolved as the gold standard for the treatment of allergic rhinitis, the treatment options should now be tailored to the individual patient and it is very important for the otolaryngologist to

RHOP VII

RM 4-2 (Convention B)

Chair : Yong Jin PARK, Snidvongs KORNKIAT

Olfaction

» RHOP-36 08:00~08:10

» Olfactory training induces changes in olfactory marker protein in mouse model

Department of Otorhinolaryngology, Catholic University College of Medicine

Boo-Young KIM, Byung Guk KIM, Sung Won KIM, Soo Whan KIM, Ji Hyeon SHIN, Jin Hee CHO, Yong Jin PARK

Objectives: 후각은 풍미를 증가시키는 기능 외에 후각이 없을 경우 독성물질, 화재에 노출될 위험이 있어 중요하다. 2013년 통계청발표로 26,185 명이 후각문제로 진료를 보았으며 이는 암이나 급성 질환이 아닌 문제인 것을 감안할 때 많은 수이다. 문제점은 이 환자들 대부분이 스테로이드 치료 외에 과학적으로 증명된 치료가 없으며, 스테로이드로 효과를 보는 경우도 10~20% 정도이다. 2009년 독일에서는 인간의 후각신경계에 가소성 (neural plasticity) 이 있고 훈련으로 후각능이 향상되는 이론에 착안하여 후각훈련법을 이용한 치료를 시도하였다. 40명의 감각신경성 후각저하 환자군을 대상으로, 후각 자가훈련 (olfactory training)을 시행하여 대조군에 비하여 효과 있음을 보고하였다. 최근에는 후각훈련방법에 변화를 주어 후각호전을 보고하였다. 본 연구자는 이번 연구를 통해 후각후련의 효과를 과학적으로 입증하고자하여 mouse model 에서 후각훈련을 진행하였다.

Methods: 10주 된 mouse 17마리, BALB/C mice (18~20g), 을 이용하여 grouping 을 시행하였다. grouping 은 3개로 하였으며, control (n=4), anosmia (n=6), olfactory training (n=7), anosmia 와 olfactory training group 의 mice 에는 3 methyl indole (mi)를 6000µg/mouse intraperitoneal injection 하였으며 다음날 food finding test (FFT)를 시행하였다. 후각훈련 (박하, 레몬, 술, 계피)을 하루 3회 시행한후 2주후 조직을 이용하여 형광염색을 하였으며 olfactory maker protein (OMP) 에 대하여 PCR 와 western blot 을 진행하였다.

Results: control (n=4), anosmia (n=4), olfactory training (n=3), 총 11마리가 무후각 mouse model 로 만들어졌으며 2주간의 훈련 이후 비강 조직을 채취하여 결과를 분석하였다. Western blot결과, OMP 값은 training group 에서 2주간의 후각훈련후 anosmia group에 비하여 증가하는 것을 확인하였고, olfr1507 값은 증가하지 않았다. PCR 결과, OMP 값은 training group 에서 anosmia group에 비하여 증가하는 것을 확인하였다. 형광 염색 결과 Anosmia group에서는 Control group에 비하여 감소한 OMP, olfr1507 merge부분을 확인할 수 있었다. HE 염색결과에서는 Anosmia군은 Control에 비하여 pseudostratified columnar epithelium 상피 두께가 감소한 모습을 보였고, 후각상피의 핵 수가 감소하고, 후각훈련을 한군에서는 상피 두께가 회복되었으며 핵수도 증가하는 것을 확인하였다.

Conclusions: 후각훈련은 mouse model 을 통한 조직학적 분석뿐만 아니라 protein level 에서도 효과를 확인할 수 있는 것으로 사료된다.

» RHOP-37 08:10~08:20

» Tumor necrosis factor alpha and interleukin-5 have a synergistic apoptotic effect on olfactory sphere cells in allergic mice models

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Dong-Kyu KIM¹, Seung Ah CHOI², Ji Hoon PHI², Dae Woo KIM³

Objectives: Olfactory dysfunction is one of the major symptoms in patients with allergic rhinitis or rhinosinusitis. However, the mechanism by which olfactory neural cells are damaged, remains still unclear

Methods: Olfactory neural stem cells (OSCs) were established after dissociation and serial cultures of cells from the mouse olfactory mucosa. Viability and proliferation of

OSCs were compared between control and allergic rhinitis mice model. OSCs markers such as musashi, LGR5, SOX2 were compared in vivo between groups. To elucidate which cytokines have an inhibitory effect on viability or proliferation of OSCs, viability and apoptotic markers of OSCs was investigated, when treated with IL-4, IL-5, IL-17A and TNF- α alone or in combination.

Results: OSCs were successfully isolated from mice olfactory mucosa and showed markers of NSCs such as Musashi and SOX2 and neural differentiation. When we compared the characteristics of OSCs between nasal mouse mucosa from control and allergic rhinitis mice model, significantly fewer neurospheres, reduced clonogenic capacity, and decreased expression of olfactory NSC markers were observed in allergic mouse model which was also confirmed in vivo model. When several major cytokines were treated on OSCs, i.e., IL-4, IL-5, IL-17A, and TNF- α , only TNF- α showed inhibitory effect on OSCs. Interestingly, IL-5 has a synergistic effect on the viability of OSCs in combination with TNF- α , whereas IL-5 alone does not.

Conclusions: Our results suggest that OSCs showed lower expression in allergic rhinitis mice. TNF- α and IL-5 had a synergistic apoptotic effect on the viability of OSCs. Therefore, these cytokine may be therapeutic targets for olfactory dysfunction in patients with allergic rhinitis.

» **RHOP-38 08:20~08:30**

» Reliability and validity of the Korean version of the questionnaire of olfactory disorders

Department of Otorhinolaryngology-Head and Neck Surgery, Asan Medical Center, University of Ulsan College of Medicine
Woo Ri CHOI, Hyeon-Yeong JEONG, Ji Heui KIM

Objectives: The questionnaire of olfactory disorders (QOD) is a self-reporting questionnaire that provides subjective information about the olfactory dysfunction developed by Thomas Hummel and Johannes Frasnelli in 2005. QOD

is widely used in clinical practice because of its high level of reliability and efficacy. This study aims to evaluate the reliability and validity of the Korean version of the QOD.

Methods: A Korean version of the QOD was evaluated for split-half reliability and internal consistency. The validity analysis included components of content validity and comparisons between a Medical Outcomes Study Questionnaire Short Form 36 Health Survey (SF-36).

Results: A total of 274 patients completed two different surveys (QOD and SF-36). The split-half reliability was 0.97. Cronbach's a coefficient for internal consistency of the QOD-Parosmia statements (QOD-P), QOD-Life Quality statements (QOD-LQ), QOD-Sincerity statements (QOD-S), and QOD-Visual analogue scale (QOD-VAS)-sections were 0.683, 0.907, 0.303, and 0.951, respectively. There were statistically significant correlations between the QOD-P, QOD-LQ, QOD-S, and QOD-VAS sections and the SF-36.

Conclusions: The Korean version of QOD has proven to be a generally reliable and valid questionnaire when evaluating Korean patients with suspected olfactory dysfunction.

» **RHOP-39 08:30~08:40**

» Effect of middle turbinate partial resection in olfactory function in endoscopic transsphenoid approach: A retrospective results

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Dong Jo KIM¹, Seok-Hyun KIM¹, Soon-Ki SUNG², Kyu-Sup CHO³, Hwan-Jung ROH¹, Sue Jean MUN¹

Objectives: The purpose of this study was to compare the postoperative olfactory function in middle turbinate partial resection (MTR) group and middle turbinate preserved (MTP) group in endoscopic transsphenoid approach (TSA) patients.

Methods: This study was a retrospective review of 28 patients who had undergone Endoscopic TSA due to pituitary adenoma or Rathke's cleft cyst in Pusan National University Yangsan Hospital from May 2015 to August 2017. MTP group was defined as the group of patients whose middle turbinates were preserved. MTR group was defined as the group of patients whose lower third of middle turbinates were partially resected unilaterally or bilaterally in purpose of wide operative field. Endoscopic TSA was performed with same surgeons with otherwise same procedure including sphenoidotomy with posterior septal mucosa debridging. Olfactory function was compared with preoperative and postoperative-3-month Korean version of sniffing sticks test (KVSS-II) which is composed of threshold (T), discrimination (D), identification (I) scores each making 16 with all correct answers. TDI score under 15 is considered as anosmia, more than 30 is considered as normal olfactory function and in between 15 and 30, as hyposmia.

Results: Among 28 patients, there was 24 pituitary adenoma patients and 4 Rathke's cleft cyst patients. Male patients were 42.9% (n=12) and mean age was 47 (SD 15.4). There were 15 patients in MTP group and 13 patients in MTR group. Preoperative KVSS-II score was 26.2 and postoperative-3-month KVSS-II score was 25.8. There was no significant difference in olfactory score before and after 3 months of endoscopic TSA. No difference in olfaction was observed with MTR and MTP group after 3 months of endoscopic TSA ($p = 0.311$).

Conclusions: Resection of lower third of middle turbinates may produce low morbidity in respect of olfactory function after three months of endoscopic TSA.

» **RHOP-40 08:40~08:50**

» Effects of olfactory training with topical nasal spray for patients with olfactory disorder

SHIN, Mi-Kyung YE

Objectives: Olfactory Training (OT) is an alternative treatment based on modulation of the regeneration process of the olfactory system via repeated exposure to odors. We conducted a prospective study of the impact of OT with intranasal corticosteroid in patients with olfactory dysfunction.

Methods: Our study population was made up of 134 adults—44 men and 90 women (mean age: 54.8 ± 10.8 year)—with olfactory dysfunction of different etiologies (post upper respiratory tract infection $n = 86$; post-traumatic $n = 18$; and idiopathic $n = 30$). For their training, patients exposed themselves to four different odors twice a day. All patients used fluticasone nasal spray (2 sprays in each nostril once daily). Olfactory function was evaluated at baseline and again at 3, 6, 9 months, and results were quantified in the form of each patient's TDI (threshold, discrimination, and identification) score. A clinically significant improvement of TDI scores was defined by an increase of at least six points.

Results: Olfactory function improved in 90 of 134 patients (67.2%). Taste disturbance was accompanied in 60% of patients. The etiology of olfactory disorder, sex, and age had statistically significant influence on the improvement rate of olfactory function. However, initial severity of olfactory loss and duration of olfactory loss had no statistically significant influence on the improvement rates after OT. Subset analysis showed that olfactory function mainly increased olfactory discrimination followed by identification.

Conclusions: The present study showed that OT with topical nasal spray was beneficial to improvement of olfactory function in patients with olfactory dysfunction. OT appeared to be particularly useful in post-infectious and female patients.

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Young-Do JUNG, Bu-Kwan GIL, Seung-Heon

RHOP VIII

RM 2-2 (Skylark)

Chair : Seong H CHO, Seung-Heon SHIN

Rhinosinusitis (Basic) II

» **RHOP-41 08:00~08:10**

» Targeting IL-17 in CRS with nasal polyp

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University College of Medicine*

**Eun Hee KIM, Jin-Sang BAE, Ji Hye KIM,
Young-Jun CHUNG, Ji-Hun MO**

Objectives: Recently, IL-17 is known to play an important role in inflammatory disease including CRS. It is known to be increased in CRS with nasal polyp (NP). In this study, we evaluated the expression of IL-17 in CRS tissues and identified the cellular source of IL-17 in CRS with NP.

Methods: The expression of IL-17 in human CRS tissues were evaluated using PCR and immunohistochemistry (n=20 each group). And the cellular sources of IL-17 were evaluated with double staining immunohistochemistry using confocal microscopy. IL-17A, CD68, CD163, ELA2 CD56, CD4 and CD11c antibodies were used to evaluate the cellular sources of IL-17. Eosinophilic and non-eosinophilic polyps were evaluated (n=5 each sample).

Results: PCR and IHC showed that IL-17 expressions were increased in both eosinophilic and non-eosinophilic polyps, with significantly higher expression in noneosinophilic nasal polyp. Confocal staining revealed that about 60% of CD68+ M1 macrophage, 30% of ELA2+neutrophil and 10% of CD4 T cell coexpressed IL-17 irrespective of eosinophilic and noneosinophilic polyp, showing that M1 macrophage and neutrophil were major sources of IL-17 in nasal polyp. NK cell, M2 macrophage and dendritic cells did not produce IL-17 in both eosinophilic and non-eosinophilic nasal polyp.

Conclusions: These data showed that IL-17 were highly

expressed in nasal polyp and the major cellular sources are macrophage and neutrophil, suggesting that IL-17 might be used as target therapy in CRS with NP. In addition, M1 macrophage or neutrophil can also be used as a cellular target in CRSwNP.

» **RHOP-42 08:10~08:20**

» Doxycycline inhibits the development of nasal polyp in murine model

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Objectives: Chronic rhinosinusitis with nasal polyp is related with epithelial-mesenchymal transition (EMT). Doxycycline is beneficial effect for chronic rhinosinusitis with nasal polyp. The aims of this study were to investigate the inhibitory effect of doxycycline on nasal polyp development and to determine its underlying mechanism in murine model.

Methods: After induction of OVA-induced allergic rhinosinusitis in mice, SEB was instilled into the nasal cavity of mice for twelve weeks. Histopathologic changes were evaluated using hematoxylin and eosin, Sirius red for eosinophils, AB/PAS for goblet cells and Masson's trichrome for collagens. The expression of EMT markers and its transcription factors were evaluated by immunohistochemical staining. Total IgE, OVA-specific IgE and systemic cytokine levels including IFN- γ , IL-4, IL-5, IL-10 and IL-17A were measured using ELISA.

Results: OVA and SEB induced the number of nasal polyp-like lesions, degree of eosinophilic infiltration, number of goblet cells and Masson's trichrome-stained areas were reduced significantly by intranasal doxycycline treatment. The expression levels of the total IgE, OVA-specific IgE, IL-4, IL-5, IL-10 and IL-17A were significantly decreased

by administration of doxycycline. Doxycycline did not affect the OVA and SEB induced-IFN- γ expression. In addition, expression levels of EMT markers, TGF- β 1 and transcription factors significantly decreased with doxycycline treatment.

Conclusions: Intranasal doxycycline treatment is effective for the prevention of nasal polyp development in murine model. The underlying mechanism might involve upregulated expression of TGF- β 1 and its signaling pathways.

» **RHOP-43 08:20~08:30**

» Effects of azathioprine and its metabolites on inflammatory cytokines in human nasal polyp organ cultures

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Nam-Kyung YEO¹, Woo Joo PARK², Daeo-Woon EOM³, Mi Young OH⁴, Ji Hwan LEE⁴

Objectives: Azathioprine (AZA) and its first metabolite 6-mercaptopurine (6-MP) are important immunosuppressive agents used for the therapy of a variety of diseases, including autoimmune hepatitis, rheumatoid arthritis, and ulcerative colitis. The aim of this study was to investigate the effects of AZA and 6-MP on T cell mediated inflammation in organ-cultured NPs.

Methods: To determine the effects of AZA and 6-MP, NP tissues were cultured using an air-liquid interface method. Cultures were maintained in the absence, presence of steroid, AZA, and 6-MP for 72 hours. Elaboration of cytokine TNF- α , IL-2, IL-4, IL-5, IL-13 into the culture media was quantitated using the ELISA method. The genetic changes of TNF- α , IL-2, IL-4, IL-5, IL-13 in cultured mucosa were measured using a real time PCR. Hematoxylin and eosin staining of cultured mucosa were performed to observe inflammation.

Results: Expressions of TNF- α , IL-2, IL-4, IL-5, IL-13 mRNA in the NP treated by steroid, AZA, and 6-MP were significantly lower than in the control. According to ELISA, the TNF- α , IL-2, IL-13 were reduced significantly by topical steroid, AZA, and 6-MP, although their effects on IL-4 and IL-5 were less potent than others. With histologic exam, less inflammatory cell infiltrations were found in NP tissues treated by steroid, AZA, and 6-MP than in control, but there was no statistical significance.

Conclusions: Topical azathioprine might be an effective drug for the management of CRSwNP.

» **RHOP-44 08:30~08:40**

» Immunomodulatory effect of OM-85 BV (Broncho-Vaxom) on human nasal fibroblasts

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Su Young JUNG, Jin-Young MIN, Kun Hee LEE, Sung Wan KIM

Objectives: The bacterial lysate Broncho-Vaxom (OM-85 BV) protects against bacterial or viral infections by modulating host immune responses. Although the underlying mechanisms in immune cells are understood, the effect of OM-85 BV has been underexplored in structural cells such as fibroblasts (FBs). Interleukin (IL)-8 and interferon (IFN)- γ are important in the mechanism of OM-85 BV, and RANTES is important in various nasal inflammatory diseases. We investigated the effect of OM-85 BV on IL-8, RANTES, and INF- γ production in cultured primary human nasal FBs with or without lipopolysaccharide (LPS) stimulation.

Methods: Nasal FBs were isolated from human nasal inferior turbinate and cultured. For stimulation and treatment, submerged FBs were divided into 3 groups. Group 1 was a negative control with no stimulation, group 2 was given only LPS stimulation, and group 3 was pretreated with OM-85BV at different concentrations and times, followed by stimulation with LPS. IL-8, RANTES,

and IFN- γ expression was confirmed by real-time PCR and enzyme-linked immunosorbent assay.

Results:IL-8 and RANTES mRNA expression in nasal FBs was significantly increased following stimulation with LPS after pretreatment with OM-85 BV (group 3) compared to that following stimulation with LPS alone (group 2). Similar trends were observed in protein level of IL-8 and RANTES. However, there was no significant difference in IFN- γ mRNA expression.

Conclusions:OM-85 BV significantly increased mRNA expression and protein levels of IL-8 and RANTES in LPS-stimulated nasal fibroblasts. Given this, OM-85 BV may play a role as an immunomodulator in the bacterial infection state by activating the immunostimulation reaction by regulating IL-8 and RANTES expression in inflammatory sinonasal disease caused by bacterial infection.

» **RHOP-45 08:40~08:50**

» Proprotein convertase PACE4 has a potential role in mucous cell hyperplasia in IL-4-stimulated human nasal epithelial cells

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Objectives:Disruption of the recovery process by repeated insults leads to deleterious hyperplastic, metaplastic, and inflammatory epithelial lesions found in chronic respiratory diseases. Interestingly, many secretory proteins relevant to airway remodeling, such as growth factors and receptors, cell adhesion molecules, and metalloproteinases, are converted to biologically active molecules through the actions of enzymes known as the proprotein convertases (PCs). To date, seven different PCs (furin, PACE4, PC1/3, PC2, PC4, PC5/6, and PC7) have been identified in mammals. The inflammatory cytokine IL-4, a central

mediator of chronic allergic airway diseases, is known to induce mucous cell hyperplasia and mucus overproduction.

Methods:Here, we focused on the potential role of PCs in IL-4-induced mucous cell hyperplasia in primary human nasal epithelial cells (HNECs) differentiated in air-liquid interface (ALI) culture for 2 weeks.

Results:We found that IL-4 stimulation increases the expression of PACE4 as well as MUC5AC. Immunofluorescence analysis revealed that PACE4 and MUC5AC are colocalized in some mucous cells in IL-4-stimulated HNECs. In addition, specific lentiviral shRNA-mediated knockdown of PACE4 significantly reduced MUC5AC expression in IL-4-stimulated HNECs. Furthermore, PACE4 was up-regulated in the nasal mucosa of allergic rhinitis compared to control nasal mucosa.

Conclusions:Altogether, these findings suggest that PACE4 has a potential role in mucous cell hyperplasia and understanding of the precise role of PACE4 in Th2-driven allergic airway inflammation will lead to the development of disease-modifying approaches to treat allergic airway diseases.

» **RHOP-46 08:50~09:00**

» Clusterin induces MUC5AC expression via activation of NF- κ B in human airway epithelial cells

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Objectives:Clusterin (CLU) is known as apolipoprotein J, and has three isoforms with different biological functions. CLU is associated with various diseases such as Alzheimer's disease, atherosclerosis, and some malignancies. Recent

studies report an association of CLU with inflammation and immune response in inflammatory airway diseases. However, the effect of CLU on mucin secretion of airway epithelial cells have not yet been understood. Therefore, the effect and brief signaling pathway of CLU on MUC5AC (as a major secreted mucin) expression were investigated in human airway epithelial cells.

Methods:In the tissues of nasal polyp and normal inferior turbinate, the present of MUC5AC and CLU was investigated using immunohistochemical stain and Western blot analysis. In mucin-producing human NCI-H292 airway epithelial cells and primary cultures of normal nasal epithelial cells, the effect and NF κ B signaling pathway of CLU on MUC5AC expression were investigated using immunohistochemical stain, RT-PCR, real-time PCR, enzyme immunoassay, and Western blot analysis.

Results:In the nasal polyps, MUC5AC and CLU were abundantly present in the epithelium on immunohistochemical stain, and nuclear CLU (nCLU) was strongly detected on Western blot analysis. In human NCI-H292 airway epithelial cells or the primary cultures of normal nasal epithelial cells, recombinant nCLU increased MUC5AC expression, and significantly activated phosphorylation of NF κ B. And BAY 11-7085 (a specific NF κ B inhibitor) and knockdown of NF κ B by NF κ B siRNA significantly attenuated recombinant nCLU-induced MUC5AC expression.

Conclusions:These results suggest that nCLU induces MUC5AC expression via the activation of NF κ B signaling pathway in human airway epithelial cells.

RHOP IX

RM 2-2 (Skylark)

Chair : Yong-Bok KIM, Revadi GOVINDARAJU

Allergy

» **RHOP-47 09:00~09:10**

» Immunomodulatory effect of adipose stem cells-derived extracellular vesicles on Th2-mediated inflammation

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**Sung-Dong KIM¹, Shin Ae KANG², Hak Sun YU²,
Sung Hoon JUNG³, Sue-Jean MUN³, Kyu-Sup CHO¹, Hwan-Jung ROH³**

Objectives:Extracellular vesicles(EVs) are nanosized membranous vesicles, secreted into extracellular space. Various EVs are transferred to recipient cells and affect their function. However, there is no report that evaluates the in vitro immune-modulating effect of adipose stem cell(ASC)-derived EVs on Th2-mediated inflammation of allergic airway diseases. This study was performed to evaluate the in vitro immunomodulatory effects of ASCs-derived EVs on inflammatory mediators of Th2 inflammation.

Methods:ASCs were isolated and cultured from the abdominal fat of C57BL/6 mice. The EVs were isolated from supernatant of ASCs and images were obtained using a JEM1011 microscope. The diameters of EVs were measured using a Zetasizer Nano ZS. Mouse lung epithelial cells were obtained from ATCC and primary lung epithelial cells were isolated from lung tissue of C57BL/6 mice. The cells were pre-treated with 200ng/ml of aspergillus for 2 hours, and then followed by treatment with 10 μ g/50 μ l of control supernatant and ASCs supernatant with or without

EV. To evaluate the role of EVs in macrophage activation, in vitro bone marrow-derived macrophage(BMDM) stimulation assay was performed. Real time PCR was performed to determine the levels of eotaxin, IL-25, TGF- β , IL-10, i- NOS and Arg1 mRNA

Results:The average quantity and size of ASCs-derived EVs was 3850 ± 150 μ g/ml and 130.3 ± 65.7 nm. The gene expression of eotaxin and IL-25 was significantly increased after treatment of aspergillus. However, ASCs supernatant with EV significantly decreased the expression of eotaxin and IL-25 in both lung epithelial cells. The expression of TGF- β and IL-10 were significantly increased after ASCs supernatant with EV. In the BMDM assay, the expression of Arg1 was significantly increased after ASCs supernatant with EV.

Conclusions:EVs of ASCs have immunomodulatory effects in Th2-mediated inflammation treated with aspergillus, characterized by down- regulation of eotaxin and IL-25, and up-regulation of TGF- β , IL-10, and Arg1.

» **RHOP-48 09:10~09:20**

» Reversal of olfactory disturbance in allergic rhinitis related to OMP suppression by intranasal budesonide treatment

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JANG³, Young Hyo KIM³

Objectives:We evaluated the severity of olfactory disturbance (OD) after experimentally inducing allergic rhinitis (AR) and local allergic rhinitis (LAR) in mice. We also investigated the effects of an intranasal steroid on nasal allergic inflammation, and its underlying mechanism.

Methods:Thirty BALB/c mice were divided into five groups (n = 6 each). The control group was sensitized intraperitoneally (i.p.) and challenged intranasally (i.n.) with saline only. The AR group was subjected to i.p. and i.n. ovalbumin (OVA) administration for AR induction. The LAR group was challenged i.n. with 1% OVA for inducing local nasal allergic inflammation. The OD group (total anosmia) was subjected to i.p. methimazole administration once (75 mg/kg). In the intranasal budesonide group, along with AR induction, i.n. budesonide (12.8 μ g per time) was administered 30 minutes after the i.n. OVA challenge.

Results:In the olfactory function test, the mice of the AR (81.3 ± 19.8 s) and LAR groups (66.2 ± 12.7 s) took significantly longer to detect the pellets than the control group mice (35.6 ± 12.2 s, $p < 0.01$). However, the duration was significantly shorter than that in the OD group (710.4 ± 259.6 s, $p < 0.01$) After treatment, the intranasal budesonide group exhibited significantly better results (35.8 ± 11.9 s) compared with the AR and LAR groups ($p < 0.01$). The AR and LAR groups showed considerable olfactory epithelial damage, and suppression of olfactory marker protein (OMP) expression compared with the control group (although not as severe as group D). In the intranasal budesonide group, the olfactory lesions and OMP expression had improved substantially.

Conclusions:OD was caused by olfactory epithelial damage and suppression of OMP expression in nasal allergic inflammation, and it could be reversed using an intranasal steroid.

» **RHOP-49 09:20~09:30**

» Increased expression of neuropeptide, neuromedin U in allergic rhinitis and its expression

levels is affected by aryl hydrocarbon receptor agonist, contributing to nasal hyperreactivity

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**Jae Woong HWANG, Young Ho JOO, Tae Hoon
KIM, Sang Hag LEE**

Objectives: Pollutants produced by industrial and traffic-related activities have been linked to allergic rhinitis. These noxious agents induce their effects through the aryl hydrocarbon receptor. Neuromedin is a neuropeptide expressed not only in the central nervous system but also in various organs, including the gastrointestinal tract and lungs. Recent reports showed that neuromedin may be involved in the allergic pathogenesis. The present study is to investigate whether neuromedin U and its receptor neuromedin receptor1 is expressed in normal and allergic nasal mucosa and regulated by aryl hydrocarbon receptor related to air pollutants.

Methods: Normal and allergic nasal mucosa was obtained from healthy control and allergic patients and kept until analysis. The expression of neuromedin U and neuromedin receptor1 was evaluated with immunohistochemistry, western blot, and real time PCR. In cultured cells stimulated with aryl hydrocarbon receptor agonist, the expression levels of neuromedin U was evaluated using real time PCR and western blots.

Results: In normal and allergic nasal mucosa, neuromedin U and its receptor, neuromedin receptor 1 are localized to the superficial epithelial layer, submucosal glands, and vascular endothelium. Neuromedin U is increased in its expression levels in allergic nasal mucosa than normal control mucosa whereas the levels of neuromedin receptor1 is not altered. In cultured epithelial cells stimulated with aryl hydrocarbon receptor, the neuromedin U levels is increased in comparison to the non-stimulated cells.

Conclusions: The present study showed that neuropeptide, neuromedin U is expressed in normal nasal mucosa, and its levels is increased in allergic nasal mucosa. Furthermore,

its levels is increased in cells treated with aryl hydrocarbon receptor agonist. Therefore, these results suggest that neuromedin may contribute to induce nonspecific nasal hyperreactivity in allergic rhinitis.

» **RHOP-50 09:30~09:40**

» Staphylococcus epidermidis, microbiome from human allergic nasal mucus suppresses the secretion of epithelial-derived Th2 cytokines in nasal epithelium

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Objectives: Staphylococcus epidermidis (S epi) is the most important member of the coagulase-negative staphylococci and one of the most abundant microbial colonizers of human skin or mucosa. We also confirmed S epi was most frequently encountered microbiome in nasal mucus of allergic rhinitis (AR) patients. Our goal of this study is to determine the role of dominant microbiome, S epi at allergic nasal mucus and to prove the relationship with Th2 cytokines secretion in nasal epithelium.

Methods: Nasal mucus was obtained from 17 AR individuals using cotton mucosal swab and microbiomes were assessed using high-throughput next-generation sequencing (NGS) analysis. S epi was obtained from culture-based method and infected to cultured nasal epithelial cells (NEC).

Results: NGS data showed that S. epi was most dominant microbiome in allergic nasal mucus. We confirmed the distribution of nasal microbiome in AR patients through culture-based analysis and 50.38% of microbiome turned out to be S epi. S epi separately harvested from 4 AR nasal mucus and NECs were inoculated with S. epi as MOI 0.25.

FemA of S epi was elevated from 8 hr post of infection (hpi) and S. epi-infected NHNE cells significantly attenuated mRNA levels and the amount of secreted protein of TSLP from 8 hpi. However, IL-25 and IL-33 expressions were not altered in S epi-infected NHNE cells. We found that cultured ARNE cells exhibited significantly higher expression of TSLP and IL-33 than NHNE cells and TSLP expression was greater in ARNE cells than IL-33 without allergen stimulation. Interestingly, S epi-infected ARNE cells showed significantly lower TSLP mRNA and secreted protein levels.

Conclusions: Here we estimate that S. epi is most dominant microbiome in nasal mucus of AR patients and inoculation of S epi to NEC reduces the secretion of epithelial-derived Th2 cytokines, TSLP in both NHNE and ARNE. These findings suggest the possibility that nasal microbiome might enhance anti-allergic immune responses at the level of nasal epithelium.

» **RHOP-51 09:40~09:50**

» Initial Influenza virus spread can be limited in allergic asthma through rapid robust of type III interferons in Respiratory epithelium

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Objectives: Although asthmatics has been considered to be highly susceptible to respiratory viral infection and most studies have focused on exacerbation of asthma by influenza A virus (IAV) infection, few experimental evidences exist to directly demonstrate that asthmatic mice are actually resistant to IAV infection. Here we show that asthmatic mice are not highly susceptible to IAV in the early stage of infection and type III interferon (IFN) maintains antiviral

immune response in the lung of IAV-infected asthmatic mouse resulting in inhibition of initial viral spread.

Methods: C57BL/6 Mice with allergic asthma were infected with IAV (WSN/33: H1N1) and survival rate, body weight, viral titer, histopathologic findings of lung and cytokine profiles including IFNs and Th2 cytokines were measured.

Results: Notably, asthmatic mice were significantly resistant to IAV and showed completely lower viral load until 7 days after infection. Further, IAV-infected asthmatic mice exhibited decreased Th2-related inflammation in lung tissue until 7 days. These increased antiviral resistant mechanism and reduced Th2 inflammation were attributable to rapid induction of type III IFNs and blockade of type III IFNs in asthmatic lung led to aggravate IAV infection and to enhance the production of Th2 cytokines. Actually, asthmatic mice showed higher morbidity beyond 7 days after infection but intranasal administration of type III IFNs completely protect IAV-caused lung infection until 14 days after infection.

Conclusions: Taken together, our study indicates that the rapid induction of type III IFN might be distinctive immunologic findings in the respiratory tract of IAV-infected asthmatic mice at the early stage of infection and crucial for suppression of initial viral spread in vivo asthma accompanying with restriction of Th2 cytokine productions.

» **RHOP-52 09:50~10:00**

» Temporal change and certain sensitization patterns are associated with allergic airway disease: A single center cross sectional study in Korea

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Joman LAXAMANA, Kate TISHKEVICH, Sung-Woo CHO, Jeong-Whun KIM, Chae-Seo RHEE

Objectives: Our previous study showed a significant change in allergen sensitization from 2006 to 2016. The objective

of this study is to determine whether change in sensitization is significantly associated with allergic asthma (AA) and allergic rhinitis (AR).

Methods: We included all skin-test positive patients in 2006 and 2016 from a single center. Seven types of allergens were evaluated: house dust mite (HDM), mold, cockroach, animal dander, tree pollen, weed and grass pollen. First, we determined whether there was actual difference in the prevalence of AR and AA between 2006 and 2016. Second, we performed binary logistic regression to determine the association of AA and AR to sensitization patterns. Children (age <18 years) and adults (age ≥18 years) were analysed separately.

Results: A total of 1,156 patients in 2006 (373 children and 583 adults) and 1,047 patients in 2016 (160 children and 887 adults) were analyzed. Comparing adults in 2006 and 2016, prevalence of AR was significantly increased (33.4% to 70.1%, $p<0.001$) while the prevalence of AA was the same (35.0% to 36.7%, $p=0.977$). In children, however, prevalence of both AR (47.7% to 90.6%) and AA (9.4% to 28.2%) had been increased significantly ($p<0.001$). In adults, age (OR= 1.020), animal dander (OR=1.653), and poly sensitization (OR=1.296) were associated with AA ($p<0.05$), while the year 2016 (OR=4.523), age (OR=0.981) animal dander (OR= 1.314) and weed sensitization (OR=1.559) were associated with AR ($p<0.05$). In children, the year 2016 (OR=3.174) and weed (OR=2.213) were associated with AA, while the year 2016 (OR=9.319) and polysensitization (OR=1.588) were associated with AR ($p<0.05$).

Conclusions: Certain sensitization patterns were associated with the development of allergic airway disease, however, temporal change (the testing year) was the most significant factor. This suggests that temporal factors that had been changed may also be involved. Therefore, further studies are needed.

» **RHOP-53 10:00~10:10**

» Dysbiosis of inferior turbinate microbiota is associated with the high total IgE level in allergic

rhinitis patients

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Objectives: Abnormalities in the human microbiota are associated with the etiology of allergic diseases. Although disease site-specific microbiota may be associated with disease pathophysiology, the role of the nasal commensal microbiota is unclear.

Methods: We sought to characterize human inferior turbinate microbiota in subjects with allergic rhinitis (n=20) and healthy controls (n=12), and to examine the relationship of mucosal microbiota with disease occurrence, sensitized allergen number, allergen-specific- and total-IgE levels.

Results: Microbial dysbiosis correlated significantly with total IgE levels representing combined allergic responses, but not with disease occurrence, the number of sensitized allergens or house dust mite allergen-specific IgE levels. Comparing to individuals with low total IgE levels (group IgElow), low microbial biodiversity with high abundance of Firmicutes phylum (Staphylococcus aureus) and low abundance of Actinobacteria phylum (Propionibacterium acnes) were observed in individuals with high total IgE levels (group IgEhigh). Phylogeny-

based microbial functional analyses indicated an increase in signal transduction-related genes and a decrease in energy metabolism-related genes in group IgEhigh as shown in the microbial features with atopic and/or inflammatory diseases.

Conclusions: Dysbiosis of the inferior turbinate mucosa microbiota, particularly an increase in *S. aureus* and a decrease in *P. acnes*, is linked to high total IgE levels in allergic rhinitis, but not to disease occurrence, the number of positively reacted allergens or individual allergen-specific IgE levels. These suggested that inferior turbinate microbiota may be affected by accumulated allergic responses against sensitized allergens. Also, site-specific microbial alterations play a potential role in disease pathophysiology.

» **RHOP-54 10:10~10:20**

» Effects of stress intensity on symptom severity and quality of life in allergic rhinitis

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Sung Dong CHO¹, Jung Woo LEE¹, Tae-Bin WON¹, Hyun Jik KIM¹, Dong-Young KIM¹, Chae-Seo RHEE², Doo Hee HAN¹

Objectives: Stress can trigger an immune response and aggravate various allergic diseases. According to the previous Allergic Rhinitis Cohort (ARCO) kids study, stress was regarded as a risk factor for pediatric allergic rhinitis (AR). In this study, we investigated the influence of stress on the severity of allergic symptoms and deterioration of the quality of life (QOL) in adult patients with AR.

Methods: A prospective study was performed among 752 patients at 8 medical centers between 2013 and 2015. Participants who had rhinitis symptoms visited each

medical center and were diagnosed as AR through history taking, endoscopic findings, skin prick tests, and serum analysis. Also, AR symptom severity, visual analog scale (VAS), stress intensity level, and the rhinoconjunctivitis quality of life questionnaire (RQLQ) scores were measured. **Results:** There was a positive relationship between stress intensity and symptom severity of AR. AR patients in high-stress group had a more chance to belonging to moderate to severe group (OR, 1.60; 95% CI, 1.01-2.50). VAS of AR symptom was 7.0 ± 1.9 in high-stress group and 6.7 ± 2.0 in low-stress group, respectively. Total RQLQ scores were 75.3 ± 35.5 and 57.4 ± 36.0 in high-stress and low-stress group, respectively. Each 7 RQLQ domain score was higher in moderate- severe group than in mild group, which was statistically significant. However, the increasing level of stress had no relationship with serum allergic markers. **Conclusions:** Our results suggest that in adults, stress might be a factor for aggravating symptom severity and deteriorating QOL of AR patients.

RHOP X

RM 2-2 (Skylark)

Chair : Seung-Kyu CHUNG, Joseph HAN

Rhinosinusitis II

» **RHOP-55 10:40~10:50**

» Etiology of maxillary sinus fungal ball effect of ventilation and anatomical factors

Department of Otorhinolaryngology-Head and Neck Surgery, Seoul National University Bundang Hospital

Goun CHOE, Sung-Woo CHO, Jeong-Whun KIM, Chae-Seo RHEE

Objectives: Sinus fungus ball is a non-invasive chronic fungal rhinosinusitis, occurring in maxillary sinus most commonly. It is suggested that poor sinus ventilation causes

maxillary sinus fungal ball, and it is known that nasal airflow has correlation with several objective anatomical measures. Which one affects development of fungal ball more, inflow or outflow of fungus, is still unknown. Therefore, we tried to make clear those relationships through this study,

Methods: 133 patients with maxillary sinus fungal ball(MSFB) who underwent endoscopic sinus surgery (January 2015 ~ December 2017) and 200 control patients were included. Control group consisted of pituitary tumor patients who underwent transsphenoidal surgery during the same period. After age and sex-matching, each 65 patients were analyzed in MSFB group and control group. The presence or absence of Haller cells, concha bullosa and anterior deviation of nasal septum of affected side were scored, and the angle of septal deviation and nasal height were measured on preoperative computed tomography images.

Results: In patients before age and sex-matching, average age was higher in MSFB group (60.47 vs. 50.8, $p=0.011$) and MSFB was more common in women (70.68% vs. 46.5%, $p<0.001$) compared to controls. After age and sex-matching, presence of Haller cells ($OR=4.138$, $p=0.003$) and large septal angle ($OR=1.240$, $p<0.001$) were negatively associated with MSFB. Contribution of concha bullosa, anterior deviation, and nasal heights were not significant ($p>0.05$).

Conclusions: Ventilation theory in the pathogenesis of MSFB were could not be validated in the current study, but structural problems could have a influence on developing MSFB. Further etiologic factors should be analyzed in the future studies.

» **RHOP-56 10:50~11:00**

» **The possible etiologies of increasing prevalence of fungal ball**

*Department of Otolaryngology, Keimyung University
School of Medicine*

Ki Ho BAE, Dong Eun KIM, Jong In JEONG

Objectives: In recent studies, the prevalence of fungal infection in nasal cavity is increasing. The increase of aging population and immunosuppressant patients is related fungal infection. However most of fungal infection in nasal cavity are fungal ball, and the patients of fungal ball are most immunocompetent. We investigate the possible etiologies of fungal ball.

Methods: From January 1998 to January 2018, we performed medical records and telephone surveys on patients who underwent surgery for fungal ball, retrospectively. We investigated the underlying diseases such as diabetes mellitus, allergic rhinitis, and chronic rhinosinusitis, and the initial reasons for referral to the hospital. Also, we investigated whether to use the mobile phone, how long it was used, and which side to use.

Results: A total of 152 patients was enrolled. In recent years, the number of patients treated with fungal ball tended to increase. There was no correlation with any underlying diseases. Among the initial reasons for referral, the proportion of incidental findings of dental evaluation and brain CT of general health screening without nasal symptom tended to increase. The use of mobile phones also tended to increase, and the concordance rate of the using side of mobile phone and the lesion side was 82.7%.

Conclusions: The increasing use of the mobile phone, general health screening and dental evaluation may influence on the increasing prevalence of fungal ball

» **RHOP-57 11:00~11:10**

» Treatment outcomes in invasive fungal rhinosinusitis extending extrasinonasal area

Department of Otorhinolaryngology-Head and Neck Surgery, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Republic of Korea
Sung Hoon NAM, Ji Heui KIM

Objectives: Invasive fungal rhinosinusitis (IFRS) is a rare but a life-threatening condition requiring extensive surgical debridement as well as adequate antifungal agents. The purpose of this study was to analyze treatment outcomes and to investigate factors that affect the disease-specific survival rate of patients with IFRS.

Methods: We investigated 41 patients who had extrasinonasal contrast enhancement lesions on preoperative Gadolinium (Gd)-enhanced magnetic resonance images (MRI) and underwent wide surgical resection of IFRS between November 2002 and October 2017. Their clinical characteristics, preoperative and postoperative images findings, operation findings, antifungal drug administration records, survival period, and follow-up period were reviewed. Prognostic factors of IFRS-specific survival were determined.

Results: The most common presenting symptoms of patients with IFRS were facial pain (n=15, 36.6%) and headache (n=14, 34.1%). The median survival period was 23.7 months (range: 0.3-110.5). 5 patients (12.2%) died due to progression of IFRS. Poor prognosis was associated with involvement of skull base and/or cavernous sinus (HR=25.6, p = 0.002).

Conclusions: IFRS-specific mortality rate in patients with IFRS extending to extrasinonasal area remains high. The involvement of skull base and/or cavernous sinus was an independent poor prognostic factor.

» **RHOP-58 11:10~11:20**

» 치과 임플란트시술에 합병된 상악동염의 치료방법

Kims Otolaryngology Clinic
Yong Jae KIM, MD, PhD

Objectives: 치과에서 요사이 보편적으로 실행되는 임플란트시술의 각종 합병증이 급증하고 혼란 일이 되었습니다.

Methods: 2003년 5월부터 2017년까지, 저자가 경험한 상악동염 57례를 치료하여 결과를 보고합니다. 종류별로 보면, 급성(30), 만성(10) 상악동염, oro-antral communication (6), 상악동내 이물(5)로 대별될 수 있으며, 염증의 원인별로는 급성, 만성, 진균성(2) 등으로 구분됩니다. 기타질환으로는 상악동후비공용종(antrochoanal polyp, 1례), 상악동저류낭종(retention cyst/3), 비중격만곡증(5).

Results: 가장 다수를 차지한 급, 만성부비동염의 수술적치료로는 상악동천자술(3), 부비동 내시경수술(16), 내시경적 진균구제술, 재수술상악동근치술(1)이었으며, 상악동 이물에 대한 치료례(5)로는, 임플란트이식물의 설치중단/제거, 상악동내 이물제거술(4)이었습니다. 이들 합병증중 특이한 점은 수술전에 시행하는 골이식관련 합병증(8)이 다수를 차지하였으며, 상당만으로 호전된례(12)도 많았으며, 수술을 권유받은 환자들(35)중 대개 수술에 응했으며, 일부(7)는 못 한 경우도 있었습니다.

Conclusions: 염증성 합병증 발생시에는 적절한 약물치료에 최선을 다 하고, 반응이 없을 때는 즉시 수술적 방법을 적절히 행하여, 치과와 이비인후과의 협진의 효과를 극대화해 야 한다고 생각합니다.

» **RHOP-59 11:20~11:30**

» Association between obesity and refractoriness of chronic rhinosinusitis with nasal polyp

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CHUNG¹, Dae Woo KIM⁴, Hun-Jong DHONG¹**

Objectives: Obesity is associated with asthma, particularly severe and uncontrolled asthma. However, there are few studies about the relationship between rhinosinusitis and obesity. The aim of this study was to determine whether obesity is associated with surgical outcome for chronic rhinosinusitis with nasal polyp (CRSwNP) and to elucidate differences in cytokine profiles according to body mass index (BMI).

Methods: 338 patients (151 obese and 187 non-obese) with CRSwNP who underwent endoscopic sinus surgery were enrolled. Preoperative demographic data, computed tomography, endoscopic findings, and sinonasal outcome test 22 (SNOT-22) scores were analyzed. When performing surgery, sinonasal tissues and blood were collected. Levels of leptin, adiponectin, and common cytokines were analyzed for 119 nasal polyps (54 obese, 65 non-obese) and plasma samples of 40 patients (18 obese, 22 non-obese). Protein levels were measured by Multiplex cytokine analysis kits and ImmunoCap[®]. Comparative analysis was performed according to the presence or absence of obesity (BMI $\geq$ 25 kg/m²) and the classification of eosinophilic nasal polyp (ENP) or non-eosinophilic nasal polyp (NENP).

Results: There was no significant difference in tissue eosinophilia, preoperative CT score, endoscopic score, and SNOT-22 scores between the obese and non-obese group. However, SNOT-22 scores were worse in the obese group at 3 and 6 months after ESS ($p=0.037$ and 0.005 , respectively). In plasma, BMI positively correlated with leptin, IL5, and IL10 and negatively correlated with adiponectin. The level of leptin and CCL11 in nasal polyp tissue was elevated in the obese group compared to the non-obese group. Leptin, CCL11, and IL5 were elevated while

adiponectin, CXCL1, and CXCL2 were decreased in the obese group compared to the non-obese group in NENP, but not in ENP.

Conclusions: Obese patients with CRSwNP had worse quality of life after ESS. These worse outcomes might be associated with an increased level of eosinophilic mediators in NENP.

» **RHOP-60 11:30~11:40**

» **Clinical characteristics causing nasal obstruction in patients requiring orthodontic treatment**

*Department of Otorhinolaryngology-Head & Neck
Surgery, Dankook University College of Medicine,
Cheonan, Korea¹*

**Yeo Lim JOO¹, MD, Yeon-Jun YANG¹, MD,
Young-Jun CHUNG¹, MD, Ji-Hun MO¹, MD**

Objectives: Prolonged nasal obstruction is known to cause dentofacial deformity. The purpose of this study was to evaluate the causes of nasal obstruction and clinical features of the patients requiring orthodontic treatment.

Methods: We retrospectively reviewed 134 patients who were referred to our department from department of dentistry before orthodontic treatment since 2010. Clinical features including the causes of nasal obstruction, subjective symptom scores, the quality of life scale (SNOT-22), physical findings, lab test including allergy test and clinical courses were investigated. In addition, we compared the clinical features between the orthodontic treatment group and age/sex matched control group who presented with rhinitis symptoms without of orthodontic treatment. Objective nasal obstruction was assessed by acoustic rhinomanometry (AR).

Results: Among 134 patients, there were 92 patients with inferior turbinate hypertrophy, 33 with tonsil adenoid hypertrophy, 8 with nasal septal deviation, and 15 with normal findings. The positive rate of allergy test was significantly higher than general population ($n=106$, 78%). However, 50 patients (37%) did not have nasal

obstruction. Out of 134 patients, 53 patients were treated surgically, and 72 patients were treated with or without medication. Orthodontic group had significantly lower symptom and SNOT-22 scores compared to the control group with allergic rhinitis, although there was no statistically significant difference in nasal dimension using AR, suggesting that the orthodontic group might be less sensitive to nasal obstruction.

Conclusions: Most of the patients requiring orthodontic treatment had otorhinolaryngologic problems that can cause nasal obstruction, however they had less symptoms in spite of those problems. Therefore, treatment might be needed if there is evidence of nasal obstruction.

RHOP XI

RM 2-2 (Skylark)

Chair : Yoo Sam CHONG, David W. JANG

Endoscopic Sinus Surgery

» **OTOP-61 11:40~11:50**

» The effect of postoperative xylitol nasal irrigation in the patients with sinonasal diseases

Department of Otolaryngology-Head and Neck Surgery, Seoul St Marys Hospital, College of Medicine,

The Catholic University of Korea

Do Hyun KIM, Soon Il YOO, Sung Won KIM,

Byung Guk KIM, Se Hwan HWANG, Jin Hee

CHO, Yong Jin PARK, Soo Whan KIM

Objectives: Xylitol has been shown good properties for postoperative nasal irrigation such as antibacterial characteristics result from enhancing innate bactericidal mechanisms and anti-adhesive effect. These effects could provide additional merit in the patients underwent ESS or septoplasty when mixing together with nasals saline irrigation solution. Therefore, in this study, we conducted

the effect of xylitol nasal irrigation in the patients underwent ESS, septoplasty or both surgery.

Methods: This study was a randomized, double-blinded, controlled crossover study comparing two methods of nasal saline irrigation. The patients were instructed to perform 14 days of thrice per day irrigations from postoperative 3 days with the first sealed envelope, followed by another 7-day washout period, and ending with 14 days of thrice per day irrigation with the other packet. Subjective outcomes questionnaires including Nasal Obstruction Symptom Evaluation(NOSE), Sino-Nasal Outcome Test 20(SNOT-20) and Visual Analog Scale(VAS) were checked. Moreover, endoscopic outcome was compared in the ESS group using modified Lund-Kennedy scoring system.

Results: During the recruitment period, 52 subjects were screened and met criteria for inclusion in this study. Comparison of the pretreatment NOSE, SNOT-20, VAS and Lund-Kennedy scoring system scores between the xylitol and saline groups demonstrated no significant differences using a Student t test ($P > .05$). The mixed effects model also showed no significant difference based on sequence of treatment. However, the patients were preferred xylitol irrigation (61%) than saline irrigation (15%).

Conclusions: In our study, there were no significant differences in NOSE, SNOT-20, VAS, and Lund-Kennedy scores with xylitol irrigation as compared to saline irrigation. However, the most of patients preferred xylitol irrigation than saline irrigation. Therefore, xylitol irrigation could be a good alternative for nasal irrigation after sinus and septal surgery.

» **RHOP-62 11:50~12:00**

» Clinical control after revision endoscopic sinus surgery and prognostic factors

Department of Otorhinolaryngology-Head and Neck Surgery, Dankook University College of Medicine

Ki-Yong CHOI, Ji-Hun MO, Young-Jun CHUNG

Objectives: 10~15% of patients who have sinus surgery will

undergo revision surgery. The purpose of this study is to classify patients into three groups according to the degree of symptom control (based on EPOS, European position paper on sinusitis) to measure the degree of actual symptom control and to identify the related prognostic factors.

Methods: We retrospectively evaluated 122 patients who underwent bilateral ESS and conducted a telephone survey according to the EPOS criteria. If symptoms are more than three, they are non-control group, 1-2 are partly controlled group, and if not, they are controlled group. Clinical information of the patient including pre-op CT scores, operation time, JESREC score and bleeding amount were evaluated. The SNOT and endoscopic findings were also examined at the first and last visit.

Results: Of the total patients, 34% were in the controlled group, 49% in the partly controlled group, and 17% in the uncontrolled group. The ratio of asthma, female and eosinophilic chronic sinusitis (classified as JESREC score) was significantly higher in the uncontrolled group. There was no significant difference in the other characteristics. The pre-op CT and endoscopic findings showed no significant difference in the three groups, but the post-op endoscopic findings were significantly higher in the uncontrolled group than in the other two groups. The pre-op SNOT was higher in the uncontrolled group and the SNOT of the last outpatient visit was similarly high in the uncontrolled group. There was no difference in SNOT difference between the three groups.

Conclusions: After surgery, 66% of the patients had partly controlled or uncontrolled symptoms. The rate of asthma, female and ECRS patients was higher in the uncontrolled group. Especially, the uncontrolled group complained of poor symptoms before surgery and even after the surgery, the symptoms remained worse than the other groups. Therefore, more cautious approach and long term follow up treatment is needed in patients with poor symptoms before surgery.

» **RHOP-63 12:00~12:10**

» Endoscopic endonasal surgery for sino-nasal

polyposis: A comparative study between general versus local anesthesia regarding compliance of surgery and patients' acceptance (a Continuous Study)

Otorhinolaryngology Dep., Kasr Alainy Teaching Hosp., Faculty of medicine, Cairo Univ.

**Nabil G. ZEID, MD., Ehab Abo ZAED, MD.,
Ahmed KAMEL, MD., Ahmed EL BATAWI, MD.,
Mahmoud Abu HASSAN**

Objectives: One of the most common inflammatory mass lesions of the nose are Nasal polyps (NP), which affect up to 4% of the population. Endoscopic surgery under local anesthesia (LA) may allow for a day care surgical procedure for the patient, however, extensive procedures, revision surgeries and uncooperative and pediatric age group patients will warrant use of general anesthesia (GA). Aim of this work is to compare the efficacy local versus general anesthesia for endoscopic surgical treatment of Sino nasal polyposis during operation as well as early and late postoperative period together with patient's acceptance for surgery.

Methods: A total of 60 patients with sino-nasal polyposis were divided randomly into two groups. Group 1 underwent endoscopic nasal surgery under local anesthesia and Group 2 underwent endoscopic nasal surgery under general anesthesia.

Results: Most of patients who were done under local anesthesia showed good acceptance for surgery, short time of surgery and less bloody field than those were done under general anesthesia (P- Value was significant regarding bleeding and time during surgery under local anesthesia).

Conclusions: Surgery of sinonasal polyposis under local anesthesia is an effective method for treatment of nasal polyposis as regard patient acceptance for surgery, time of surgery, very good surgical field and less cost procedure.

» **RHOP-64 12:10~12:20**

» Simultaneous middle and inferior meatal

antrostomies versus middle meatal antrostomy for fungal maxillary sinusitis:A comparative study

¹Department of Otorhinolaryngology, Konkuk University Chungju Hospital, Konkuk University School of Medicine, ²Department of Otolaryngology, Asan Medical Center, University of Ulsan College of Medicine

**Moon Sik JUNG¹, Dae Jun LIM¹,
Myeong Sang YU²**

Objectives:The aim of this study was to evaluate the usefulness of simultaneous middle and inferior meatal antrostomies (SMIA) as a treatment modality in patients with maxillary fungal sinusitis and to compare the efficacy of SMIA with that of conventional middle meatal antrostomy (MMA).

Methods:A retrospective study was performed on consecutive patients with non-invasive fungal maxillary sinusitis. 23 patients underwent endoscopic sinus surgery with simultaneous middle and inferior meatal antrostomies (SMIA group) and the remaining 25 patients were treated with the conventional middle meatal antrostomy (MMA group). Medical records were reviewed for history, clinical presentation, radiographic findings, surgical intervention, complications, and outcomes. Outcomes consisted of the visual analog scale (VAS) for the main symptoms, and maxillary sinus endoscopic scores. The stenosis or obstruction of the antrostomy site and postoperative mucociliary function was also evaluated.

Results:VAS scores for facial pain, and nasal discharge/postnasal drip was significantly improved in the SMIA group. The maxillary endoscopic score was also significantly reduced in the SMIA group. There were no significant differences between two groups with respect to the preoperative Lund-Mackay score, VAS score of nasal obstruction, nasal bleeding, postoperative mucociliary function and MMA patency.

Conclusions:The SMIA technique is useful for identifying and removing fungal debris that can not be reached through

the MMA and could bring better surgical outcomes.

» RHOP-65 12:20~12:30

» Surgical outcome on visual disturbance caused by paranasal sinus mucocoeles

Department of Otolaryngology-Head and Neck Surgery, Soonchunhyang University College of Medicine

**Jae-Min SHIN, Jae-Yeop JUNG, Won-Woo BAN,
Byoung-Joon BAEK**

Objectives:Paranasal sinus mucocoeles are benign, slow growing cystic lesions originating from sinus mucosa that can encroach on adjacent orbital structures, causing ophthalmologic complication such as decreased visual acuity. The purpose of this study is to evaluate surgical outcome in patients with visual disturbance of varying degree caused by paranasal sinus mucocoeles.

Methods:The medical records of 10 patients who underwent endoscopic surgery for the treatment of visual disturbance caused by paranasal sinus mucocoeles were reviewed. We examined the location of mucocoeles, the delay from the onset of visual disturbance to operation, preoperative and postoperative visual acuity of the patients. **Results:**The average age of patients was 60.2 years (range, 46-75), with males representing 60%. Commonly involved sinuses were posterior ethmoid and/or sphenoid sinuses (60%). The mean presenting visual acuity was 1.83 logMAR units (range, 0.3-3), and posttreatment was 0.58(range, 0-3). Visual acuity improvement was achieved in 80% of cases after surgical intervention. Duration from onset of visual disturbance to operation varied from 1 day to 2 years, but all the patients underwent operation within 3 days after being diagnosed.

Conclusions:This study demonstrate improvement of visual acuity in the majority of patients with visual disturbance caused by paranasal sinus mucocoeles who underwent endoscopic surgical management. Even if vision is seriously impaired, it is thought that immediate surgery after being

diagnosed may be required to obtain good visual outcomes.

» **RHOP-66 12:30~12:40**

» Clinical features of endoscopic sinus surgery in patients over 70 years old

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Inje University*

**Jung Hyeob SOHN, Kyoung Rai CHO, Bo
Young KIM, Anna PARK, Changyun KWON,
Kijin LEE, Seung Ho KIM**

Objectives:The elderly population have been increasing more and more recent decades. This change may also alter the demographic data in chronic rhinosinusitis. Although endoscopic sinus surgery is a well-documented treatment for chronic rhinosinusitis, physicians might be hesitant to undergo surgical treatment in elderly patients over 70 years of age. The authors investigated the safety and efficacy of endoscopic sinus surgery in the geriatric group.

Methods:Retrospective chart review was conducted for patients over 70 years of age. Subjects underwent endoscopic sinus surgery between 2009 and 2016. Revision cases including postoperative cheek cyst, tumor of nasal cavity or paranasal sinuses, dentigenous or non-dentigenous cyst were all excluded in this study. All the patients were followed more than 6 months after surgery. Sino-nasal outcome test-22 and endoscopic findings were evaluated preoperatively and postoperatively. Medical history and preoperative computed tomography were also checked.

Results:58 patients were finally enrolled in this study. Large mucocoele was in 6 subjects and fungal ball was seen in 21 subjects. Diffuse nasal polyposis was in 20 cases. Most subjects had comorbidity and received several medicines. However, most subjects showed obvious symptom improvement and no major complications occurred.

Conclusions:Endoscopic sinus surgery is also a safe and effective treatment for chronic rhinosinusitis in patients over 70 years of age. The limitation of this study is lack in

the amount of study group. Actually, it is difficult to obtain the subjects because it is rare to perform the operation at the age of 70 years or more. The author suggest the large multi-centered study for perioperative management of patients receiving antiplatelet agents or anticoagulants.

RHOP XII

RM 2-2 (Skylark)

Chair : Myung Gu KIM, Jaehoon LEE

Others (Clinical & Basic)

» **RHOP-67 13:30~13:40**

» Local atopy in childhood adenotonsillar hypertrophy

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**Keun-Ik YI¹, Hye-Young KIM², Jae-Wook KIM¹,
Sung-Dong KIM¹, Sue Jean MUN³, Hwan-Jung
ROH³, Kyu-Sup CHO¹**

Objectives:Although the cause of adenotonsillar hypertrophy (ATH) remains unknown, some studies have shown that allergy may be a risk factor. This study determined the levels of allergen-specific IgE (sIgE) in the adenotonsillar tissues of children with ATH and evaluated the clinical significance of local atopy in adenotonsillar tissues.

Methods:We measured 21 types of sIgE in the serum and adenotonsillar tissues of 102 children with ATH and

compared the sensitization patterns of the serum and local tissues. The patients were divided into 3 groups; atopy, local atopy, and non-atopy, according to the sensitization of serum and adenotonsillar tissues, and the clinical symptoms among the groups were analyzed.

Results: Seventy-two (70.6%) children with ATH were sensitized to more than one allergen in the serum and/or adenotonsillar tissue. Thirty (29.4%) children had no IgE-positivity to only one allergen in both serum and adenotonsillar tissues. Fifty-five (53.9%) were sensitized to at least one allergen in the serum. Seventy (68.6%) were sensitized to at least one allergen in the adenotonsillar tissue. Seventeen (36.2%) of 47 children with sIgE-negative serum had sIgE-positive adenotonsillar tissues. The rate of sIgE was significantly higher in local tissues than in serum. The rate of inhalant allergen sIgE was significantly higher in the adenoids than in the tonsils. However, the rate of food allergen sIgE was significantly higher in the tonsils than adenoids. The lifetime prevalence of asthma and allergic rhinitis (AR), recent symptoms or treatment of AR, and severity of nasal symptoms (rhinorrhea, sneezing, and nasal itching) were significantly higher in children with local atopy than with non-atopy.

Conclusions: These results confirm that allergic response may be a risk factor for ATH. Local allergic inflammation may play an important role in childhood ATH, and local atopy in adenotonsillar tissues can cause respiratory allergic symptoms in children.

» **RHOP-68 13:40~13:50**

» Clinical application of three-dimensionally printed biomaterial in patients with nasal septal deformities: A multi-center study

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of Korea*

**Do Hyun KIM, Moon Il PARK, Se Hwan HWANG,
Sung Won KIM**

Objectives: This clinical study aimed to investigate the safety and efficacy of three-dimensionally printed bioresorbable polycaprolactone (PCL) nasal implants with controlled porous microarchitectures for nasal cartilaginous framework reconstruction.

Methods: Twenty patients aged 21-61 years were included. Patients with nasal septal deviations (especially caudal septal cartilage deviations), Nasal Obstruction Symptom Evaluation (NOSE) Scale scores greater than 20, nasal obstructions persisting longer than 3 months and symptoms lasting more than 4 weeks despite proper medical treatment were included. The change in total NOSE score between the preoperative examination and the examination at the 12th week after surgery was the primary outcome. Changes in bilateral nasal cavity minimum cross-sectional area (MCA) and volume on acoustic rhinometry at 4 and 12 weeks after the surgery, nasal cavity cross-sectional area at the osteomeatal unit and nasal septum angle in the paranasal sinus on computed tomography images, and improvements in nasal symptoms and the level of satisfaction based on visual analog scale scores 12 weeks after surgery were the secondary outcomes.

Results: The pre- and 12-week postoperative results revealed significant changes in the MCAs ($p<0.001$), nasal septum angles ($p<0.001$) and NOSE scale scores ($p<0.001$). The convenience of the surgeons (90.90 ± 9.45) and the symptom improvement and satisfaction of the patients (88.30 ± 9.87) exhibited favorable results.

Conclusions: This three-dimensionally printed homogeneous composite microporous PCL nasal implant demonstrated proper mechanical support and thinness with excellent biocompatibility and surgical manipulability. Therefore, this nasal implant could serve as a clinically biocompatible material in various craniofacial reconstructions in the future.

» **RHOP-69 13:50~14:00**

» The proposed cartilage trap-door flap technique provides easy and effective results for dorsal deviations of the cartilaginous septum in selected

cases without significant complications

*Department of Otolaryngology-Head and Neck
Surgery, Kosin University College of Medicine*

Jooyeon KIM, Gwan CHOI, Jae Hwan KWON

Objectives:To introduce a novel cartilage trap-door flap technique in endonasal septoplasty to correct dorsal deviation of the cartilaginous septum, and confirm its effectiveness.

Methods:46 patients who had underwent septoplasty using the cartilage island flap technique to correct the high dorsal deviation. After elevation of septal mucosa, the bony-cartilaginous junction was separated. Deviated bony septum was removed or repositioned to the midline and surplus cartilage was removed. The most deviated point of high septal deviation was marked using needle. Septal cartilage around the point was incised coronal anterior and horizontal inferior, and partially detached. The objective evaluation of the surgical results, subjective nasal symptom score and complications of this technique were analyzed.

Results:Among 46 patients, 35 patients underwent septoplasty with bilateral inferior turbinate reduction using micro debrider, 11 patients underwent septoplasty with unilateral turbinate reduction surgery. In the nasal endoscopic finding after surgery, 32 showed a straight septum, while 14 presented a minimal curvature remaining. Subjective symptoms of nasal obstruction evaluated by Nasal Obstructive Symptom Evaluation(NOSE) scale were improved in all patients. Minimal cross-sectional area and nasal volume change were improved.

Conclusions:The proposed cartilage trap-door flap technique provides easy and effective results for dorsal deviations of the cartilaginous septum in selected cases without significant complications.

» **RHOP-70 14:00~14:10**

» Comparison of PNS view parameters between patients underwent adenoidectomy using 90-degree debrider and patients underwent

adenoidectomy using 40-degree debrider

*Department of Otolaryngology-Head and Neck
surgery, Kyung Hee University Medical Center*

Seok Hyun KIM

Objectives:Among the methods of performing adenoidectomy, a 40-degree debrider is generally used. However, if the patient's adenoid grow into the choana, it is necessary to use more bent instrument. The pre-operative PNS lateral view can be used to evaluate adenoid, but the commonly used parameter, ANR, is difficult to predict relationship between the adenoid and the choana. This study aims to compare the PNS view parameters of patients with adenoidectomy using 90-degree debrider and patients with adenoidectomy using 40-degree debrider.

Methods:Of the patients who underwent PITA, 89 patients who underwent adenoidectomy using 90-degree debrider were selected as the experimental group. And 63 patients who underwent adenoidectomy using 40-degree debrider were selected as control group considering age and gender. We compared the age, pre-op KOSA scale, post-op KOSA scale, adenoid size, nasopharyngeal space, ANR, and antroadenoid diameter.

Results:The pre-op KOSA and Post-op KOSA scale were not significantly different between the two groups. The PNS lateral view showed statistically significant differences in the adenoid size between the 90-degree debrider group (17.92 ± 3.68) and the 40-degree debrider group (16.50 ± 3.77) ($p=.022$). The ANR was 0.65 ± 0.12 in the 90-degree debrider group and 0.59 ± 0.13 in 40-degree debrider group. There was a statistically significant difference in the patient group ($p=.005$) The antroadenoid diameter was 2.97 ± 2.40 in the 90-degree debrider group and 4.52 ± 2.42 in the 40-degree debrider group. ($p<.001$) The area under the curve (AUC) of the ROC curve using the antroadenoid diameter was less than 0.5, indicating no cut-off value.

Conclusions:Adenoid size, ANR and antroadenoid diameters were statistically significant in patients who

underwent adenoidectomy using 90-degree debrider and adenoidectomy using 40-degree debrider.

» **RHOP-71 14:10~14:20**

» Action camera modification and utilization for recording of otorhinolaryngologic surgery

*Department of Otorhinolaryngology, Ajou University
School of Medicine*

**Ho Young BAE, Jun Young AN, Jung Jun LEE,
Dong Young KIM, Hyun Jun KIM,
Do-Yang PARK**

Objectives: Due to the development of optical instruments and the miniaturization of camera accessories, techniques for video recording in real-time are being developed. Significant improvements can be made in recording surgical procedures, particularly in the wearable action camera with high-definition video recordings from the surgeon's point of view. In the case of otolaryngologic surgery, there was a question as to whether the technology could be utilized because the scope of shooting was not wide enough to use genuine action camera. Therefore, we have studied whether we could obtain surgical images through simple modification of action camera.

Methods: The action camera was modified to match the surgical field. The lens of the action camera was selected by calculating the angle of view. The action camera was simply modified according to the design. The modified action camera can be mounted on the surgeon's head or the surgical light at first person viewpoints. Unlike conventional recording techniques that require assistant and taken at a third person viewpoint, the modified action camera is capable of capturing images in first person viewpoint and can be monitored in real time. During case, an assistant remotely controlled the action camera via the application.

Results: The modified action camera was able to capture a narrow surgical field. Cases captured video sufficient for teaching or presentation purposes. The action camera was considerably cost effective compared to other methods of

recording surgery. The entire cost was about 200 USD including the action camera, lens, and camera accessories. **Conclusions:** The modified action camera allows for high-definition, cost-effective, portable video capture of Otolaryngologic surgery. The modified action camera allows for detailed videography that can enhance surgical teaching, presentation and patient education materials.

» **RHOP-72 14:20~14:30**

» Application of new precise analysis of nasalance in uvulopalatal flap operation perioperatively

*Department of Otorhinolaryngology-Head and Neck
Surgery, Chungnam National University School of
Medicine, Daejeon, Korea*

**Soo Kyoung PARK, Young Ae KANG, Ki Sang
RHA, Yong Min KIM**

Objectives: Anatomical changes after uvulopalatal flap (UPF) may affect the nasalance and other voice characteristics. We previously reported that there were several acoustic changes in nasal-consonants after UPF. Although the Nasometer is the most widely used to measure nasalance, it depends on various parameters, such as, recording speed, quality and intensity of voice. The aim of the study is to standardize these variables in measuring nasalance, and to apply these parameters on patients who will take the UPF

Methods: A total of fifteen patients with obstructive sleep apnea who underwent UPF were recruited. All patients underwent nasalance evaluation using Nasometer at one week before operation then repeated it three months postoperatively. A part of recorded speech samples (/amma anŋyʌŋ/) was selected and modified with Praat so that every selected file could be normalized into the wave file with 70dB of intensity, 1 second of articulation speed, and 11025Hz of sampling rate. In this way, we were able to analyze the slope of nasal energy by normalizing the intensity, sampling rate, and signal length under the same condition. The slope each the front and back segments of

the nasal-consonants (/m, n, ŋ/) syllables was measured from the modified speech samples

Results: Two patients were underwent UPF only, and thirteen patients were taken both UPF and septoplasty. Five parameters, which were rising- and falling-/m/, rising- and falling-/n/, and rising-/ŋ/ were measured and analyzed. There was a significant difference in rising-/m/ after 3 months postoperative values compared with preoperative values. However, there were no significant differences in values of other nasal-consonants syllables

Conclusions: UPF operation does not affect the energy of nasal-consonants syllables. Parameter of rising /m/ may be influence of enlarged nasal cavity by septoplasty. The new standardizing analyses of nasal-consonants syllables provide easy, simple and efficient method to evaluate nasalance and voice characteristics

» **RHOP-73 14:30~14:40**

» The effects of essential oil form chamaecyparis obtusa on alternaria- induced, monocyte-derived, dendritic cell-mediated Th polarization

Department of Otorhinolaryngology, School of Medicine, Catholic University of Daegu
Deok-Su KIM, Young-Do JUNG, Bu-Kwan GIL, Mi-Kyung YE, Seung-Heon SHIN

Objectives: The essential oil of Chamaecyparis obtusa (C. obtusa), which is used in soap, toothpaste, and aromatic agents, has been known to have anti- inflammatory properties. In this study, we investigated the effects of microencapsulated C. obtusa essential oil on airborne fungus-induced dendritic cell (DC) activation and Th immune responses.

Methods: We stimulated monocyte-derived DCs with Alternaria alternate and lipopolysaccharide (LPS). To determine the anti-inflammatory effects, we pretreated the DCs with various concentrations of C. obtusa essential oil and collected the supernatants to measure interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF- α), and we

determined the expression of cell surface molecules. We determined the effects of the essential oil on CD4+ T cells polarization by culturing stimulated DCs and autologous CD4+ T cells.

Results: Alternaria enhanced the production of IL-6 and TNF- α , but pretreating DCs with 0.001, 0.01, and 0.05% of the essential oil significantly inhibited their production. Increased CD80 and CD86 expression by Alternaria was significantly inhibited with 0.05% of the essential oil. Alternaria-induced IL-5, IL-10, and interferon gamma from CD4+ T cells were significantly inhibited with C. obtusa essential oil in a dose-dependent manner.

Conclusions: C. obtusa influenced both Alternaria- and LPS-induced Th1 and Th2 polarization of CD4+ T cells. These results suggest a novel pharmacological use for C. obtusa essential oil to treat inflammatory airway diseases.

» **RHOP-74 14:40~14:50**

» Computational fluid dynamic study in obstructive sleep apnea patient

¹Department of Otorhinolaryngology-Head and Neck Surgery, College of Medicine, The Catholic University of Korea, ²Department of Mechanical Engineering, Chonnam National University
Dong Chang LEE¹, Jinbu HA¹, Huiseok KIM², Wan Ju LIM², Seunghun JUNG², Joohyung LEE¹, Sung Won KIM¹

Objectives: Obstructive sleep apnea (OSA) is a common disorder which may need surgery to widen the airway. However the success rate of surgery is variable. Thus it is necessary to predict the outcome of the surgery preoperatively. The purpose of this study is to evaluate the mechanical parameter of the upper air way in OSA patient using computational fluid dynamics (CFD) method.

Methods: We extracted the upper airway from CT of patient who is diagnosed as OSA using polysomnography and normal control. Three Dimensional structure was constructed from CT information in upper airway. The

mechanical parameters of upper airway were calculated with CFD study(Fluent).

Results: We extracted the upper airway from CT of patient who is diagnosed as OSA using polysomnography. Three Dimensional structure was constructed from CT information in upper airway. The mechanical parameters of upper airway were calculated with CFD study(Fluent).

Conclusions: The further study is needed to evaluate upper airway character and to predict the surgery result in OSA patients.

» **RHOP-75 14:50~15:00**

» Development study for quality assessment of chondrocyte based-cell therapy including scaffold

Department of Otolaryngology-Head and Neck Surgery, College of Medicine, The Catholic University of Korea

Se Hwan HWANG, Jung Yeon LIM, Do Hyun KIM, Sung Won KIM

Objectives: This study aimed to conduct a small scale manufacturing with chondrocyte and scaffolds, characterize the complex products, and develop the scientific evaluation methods for stability, potency, and safety as cell therapeutic agents.

Methods: Chondrocytes were effectively isolated from the discarded cartilage tissue during the operation of rhinitis. We established laboratory-level protocols for cell isolation, culture, and mass production and verified the cell production protocol with the quality evaluation analysis (endotoxin, mycoplasma, aseptic test, etc.).

Results: For the small scale manufacturing of chondrocyte therapeutic agent containing the scaffold, we blended the chondrocyte with the clinically applicable collagen and produced the complex cell therapeutic agents. Then, as a part of the in vitro performance, the survival and death of the cells were investigated for quality (stability) test of the product. Stability of the cells was assessed by staining and survival analysis. As a result, it was confirmed

that the cells were uniformly distributed within the supporter and maintained a high survival rate of about 60% within 24 hours. For the potency of the complex agent, the characteristics of chondrocytes were evaluated by immunostaining for chondrocyte-specific extracellular matrix proteins (SOX9, Aggrecan, Col2A). As a result, the expression level of extracellular matrix proteins is over 90%. For the safety of the complex agent, the microbiological safety of the cells in the scaffold was partially confirmed through the mycoplasma negativity test (PCR) of the cells combined with the scaffold.

Conclusions: This suggests the standard of quality evaluation of products after the practical small-scale manufacture of complex cell therapy agents, the future new industry development drive. It can be applied to preemptive standardization including complex cell treatment agent. It would be possible to contribute to the establishment of the safety of medicines through standardization.

RHOP XIII

RM 2-2 (Skylark)

Chair : Seon Tae KIM, Seok-Won PARK

Sleep Related Breathing Disorders II

» **RHOP-76 15:20~15:30**

» Intratonsillar injection of steroid nanoparticles in the preclinical model

Dep. of Otolaryngology, Univ. of Alabama at Birmingham

Do-Yeon CHO, Dong Jin LIM, Daniel SKINNER, Sean EVANS, Bradford A. WOODWORTH

Objectives: To provide new insights into therapeutic approaches aiming to resolve frequent pediatric obstructive sleep apnea with tonsillar hypertrophy without surgical removal, we have previously reported the significant

size reduction of palatine tonsils after repeated topical corticosteroids injections in a rabbit model. The purpose of this study is to determine if single intratonsillar injection of steroid (mometasone) nanoparticles can reduce the size of palatine tonsils in a rabbit model via sustained release.

Methods: PLGA nanoparticles of mometasone were prepared and characterized for the intratonsillar injection. The palatine tonsils of eight rabbits were injected either with mometasone nanoparticles (n = 4, 1mg/0.1cc) or nanoparticles alone (n = 4, 0.1cc). Rabbits were then followed for 10 weeks after single injection and harvested for histologic analysis.

Results: Sustained release of mometasone was obtained from the nanoparticles. A total of 16 tonsils (mometasone nanoparticle/nanoparticle alone = 8 vs 8) were analyzed. The tonsils that received the mometasone nanoparticles were significantly smaller than the nanoparticle alone-injected tonsils at week 3 and week 10 (p < 0.05). In histologic analysis, the tonsils that received the mometasone nanoparticle injections were significantly smaller than the nanoparticle alone-injected tonsils (p < 0.05). Lymphoid follicles were not well visualized in tonsils injected with mometasone nanoparticles.

Conclusions: We investigated the size of palatine tonsils of rabbit after single intratonsillar injection of mometasone nanoparticles and whether single injection could replace multiple steroid injections. Single intratonsillar injection of mometasone PGLA nanoparticles significantly reduced the size of tonsils without re-growth for 10 weeks.

» **RHOP-77 15:30~15:40**

» **Myhealthkeeper: 3-arm based randomized controlled trial for personal health management obstructive sleep apnea**

¹Department of Otorhinolaryngology, Seoul National University Bundang Hospital, ²Healthcare ICT Research Center, ³Department of Transdisciplinary Studies, Graduate School of Convergence Science and Technology, Seoul National University

Jeong-Whun KIM¹, Borim RYU², Seoyoon CHO², Eunyoung HEO², Se Young JUNG², Yoojung KIM³, Joongseek LEE³, Sooyoung YOO²

Objectives: Lifelog patient-generated health data, considered as an important factor for precision medicine, requires the participation of individuals. The purpose of this study is to demonstrate the design of a clinical trial to assess the effectiveness of personal health record (PHR)-based mobile health app named as MyHealthKeeper, which can help to manage daily lifestyle in patients with obstructive sleep apnea (OSA)

Methods: We developed an Android-based smartphone app and utilized wrist-band type activity tracker (Samsung Charm) to collect health-related daily activities from individual patients. Dietary record, daily step counts, sleep log, subjective stress amount, blood pressure, and weight value were recorded. We conducted a prospective randomized clinical trial in 60 patients. Sixty patients were randomly assigned into 3 groups including two intervention groups as follows: 1) mobile application and wearable device user group (n=20), 2) mobile application without wearable device user group (n=20), and 3) control group (n=20). Patients must be over BMI > 23 kg/m². All study participants completed WATCH-PAT twice. The primary outcome was weight change. Body weights before and after the trial were recorded. Changes in sleep-related test parameters were secondary outcomes.

Results: Among 60 participants (40 interventions and 20 controls) from enrollment, a total of 45 patients in each study group completed the study. 1) mobile application and wearable device user group and 2) mobile application without wearable device user group showed significantly higher weight loss than the control group (P<.05) during the study. There were no significant changes in OSA-related health outcomes.

Conclusions: We have developed an innovative approach to integrate PHR data into clinical workflow to support lifestyle interventions. Results of this study suggest that PHR-based intervention is successful in preventing weight

gain with modest weight loss and improvement in lifestyle behavior.

» **RHOP-78 15:40~15:50**

» Risk factors, predictors, and calculation of obstructive sleep apnea in adults

¹Department of Otolaryngology, Ajou University School of Medicine, ²Office of Biostatistics, Ajou University School of Medicine

Top KIM¹, So Young KANG², Sojin KIM², Do-Yang PARK¹, Hyun Jun KIM¹

Objectives: Obstructive sleep apnea is a sleep-related disorder with the high prevalence of 11.4% men and 4.7% women in Korea. In-laboratory polysomnography is the gold standard to diagnose obstructive sleep apnea and its severity. However, its limitations (time consuming, expensive, long waiting periods, and unfit for specific situations) have become an obstacle for patients with suspected obstructive sleep apnea. Therefore, we assesses the risk factors, predictors, and statistical calculation of obstructive sleep apnea for the obstructive sleep apnea screening.

Methods: A total of 2516 patients with suspected obstructive sleep apnea who had successfully received laboratory polysomnography were examined. All polysomnography data were analyzed by manual methods. Manual scoring was performed according to the revised American Academy of Sleep Medicine 2012 criteria. Obstructive sleep apnea was diagnosed with 5 times per hour of respiratory apnea and hypopnea. All parameters were evaluated statistically using correlation analysis, paired t tests, and logistic regression.

Results: The factors of age, gender, hypertension, diabetes mellitus, body mass index, neck waist, and hip were statistically related with obstructive sleep apnea. Berlin questionnaire and tonsil size were statistically related with obstructive sleep apnea. Among them, we excluded the some factors with multicollinearity of obstructive sleep

apnea related factors. And we draw a statistical calculation formula of obstructive sleep apnea in adults.

Conclusions: The risk factors and predictors of obstructive sleep apnea and our statistical calculation formula can be utilized with screening of the patients. And these tools take advantage of the efficient methods for utilizing medical resource.

» **RHOP-79 15:50~16:00**

» Uvulopalatopharyngoplasty reduces the incidence of dementia caused by obstructive sleep apnea results from the national insurance service survey 2007-20014

¹Department of Otorhinolaryngology-Head and Neck Surgery, Konkuk University College of Medicine,

²Department of Otorhinolaryngology-Head and Neck Surgery, Guro Hospital, Korea University College of Medicine

Jae Hoon CHO¹, Heung Man LEE²

Objectives: Numerous studies argued that obstructive sleep apnea (OSA) causes or exacerbates dementia including Alzheimer's disease (AD), vascular dementia (VD), or other dementia and that continuous positive airway pressure reduces the incidence of dementia. However, the results were often conflicting. Moreover, no study has investigated the efficacy of surgical treatment for OSA on dementia.

Methods: We analyzed the data from Korea National Health Insurance Corporation and defined OSA group as all people who were newly diagnosed with OSA from 2007 to 20014 and aged over 40. Propensity score matching by age and sex was used to select control group which was five times more than OSA group. OSA group was further divided into UPPP (uvulopalatopharyngoplasty) and No Surgery group. The primary endpoint was newly diagnosed AD, VD, or other dementia.

Results: Among newly diagnosed 125,417 patients with OSA, 12,664 took UPPP. As control, 627,085 people were selected. AD, VD, and other dementia increased in

OSA group compared to control while UPPP reduced their incidence to control level. However, the results were somewhat different according to various covariates including age, sex, or income level.

Conclusions:OSA increases dementia, which might be prevented by UPPP.

» **RHOP-80 16:00~16:10**

» The effect of respiratory distress index on sleep body position in patients with obstructive sleep apnea under CPAP titration

¹Department of Otorhinolaryngology-Head and Neck Surgery, Asan Medical Center, University of Ulsan College of Medicine, ²Department of Neurology, Asan Medical Center, University of Ulsan College of Medicine

**Sung Hoon NAMA¹, Sang-Ahm LEE²,
Yoo-Sam CHUNG¹**

Objectives:Previous studies have shown that tongue and pharyngeal soft tissue move further backward due to gravity at the supine position, which may exacerbate airway obstruction. In this study, it was assumed that obstructive sleep apnea (OSA) patients tend to compensate for apnea by the positional shifting during sleep. When continuous positive airway pressure (CPAP) is applied, it is assumed that the frequency

Methods:We investigated 117 patients with OSA who underwent polysomnography (PSG) and CPAP titration test from January 2015 to December 2015. We excluded patients who had only with supine position during PSG or whose total sleep time was less than 2 hours. Their clinical characteristics, underlying diseases, apnea-hypopnea index (AHI) and sleep time for different positions were reviewed. Results:The mean sleep time in supine position of all patients increased significantly from 195.0 to 326.2 minutes and at the same time, mean sleep time in decubitus position decreased from 142.8 to 44.8 minutes ($p < 0.005$, each). The mean AHI level also decreased significantly from

40.5 to 5.7 per hour ($p < 0.005$). Under the CPAP titration, position-dependent group had 132.3minutes increase in the supine position and non-position dependent group show 131.6minutes increase which did not show significant difference. The decrease in AHI was greater in the position-dependent group ($n=63$) than in non-position dependent group ($n=57$) (42.7, 28.4 per hour, $p < 0.005$).

Conclusions:In patients with obstructive sleep apnea (OSA), especially position-dependent OSA, CPAP will help maintain the supine position and reduce the apnea to improve sleep quality.

» **RHOP-81 16:10~16:20**

» The clinical features of CPAP non-adherent OSA patients and the therapeutic options for alternative treatments instead of CPAP

Department of Otorhinolaryngology, Seoul National University Hospital, Seoul National University College of Medicine, Seoul, Korea

**Yuju SEO, Yoonjae SONG, Sung Dong CHO,
Doo Hee HAN, Tae-Bin WON, Dong-Young KIM,
Hyun Jik KIM**

Objectives:This study aims to evaluate the clinical and anatomic factors of with CPAP non-adherent OSA patients, moreover, analyze the effect of individually-selected alternative treatments.

Methods:OSA patients who were recommended CPAP first was collected ($N=119$), 25 adherent and 94 non-adherent patients. In Non-adherent group, 35 patients were recommended to try CPAP again, 59 patients to alternative treatments. 15 patients were loss to follow up and 44 patients had alternative treatments (surgery $N=19$, oral appliance (OA) $N=15$, combined therapy $N=10$). 24 patients of them had follow-up polysomnogram (PSG) data after treatment. The medical records were reviewed for Demographics, Sleep Apnea Questionnaires

Results:Higher VAS score of snoring and apnea was shown in CPAP adherent group ($p=0.19$, $p=0.008$). In

PSG data, adherent group also had higher AHI and lower O2 saturation (%) ($p=0.042$, $p=0.058$). Anatomically, more patients had deviated septum and inferior turbinate hypertrophy ($p=0.069$, $p=0.041$) and Friedman's palate and tonsil grading was also higher in non-adherence group ($p=0.068$, $p=0.003$). Age, sex, underlying diseases, pretreatment BMI were not significantly different among three groups. AHI before treatment showed no significant difference among three groups, however combined therapy group got more effective reduction in AHI and percentage of AHI reduction (%) than surgery or OA group. ($p=0.024$). Anatomic findings, such as deviated septum, inferior turbinate hypertrophy, palate, tonsil size and tongue base narrowing, showed no significant difference in three groups. Conclusions: Here we estimate that adherence to CPAP is associated with degree of subjective symptoms, severity of sleep parameters and the feature of upper airway obstruction. Our clinical data suggest that surgery or OA seem to be considered as alternative treatment in CPAP non-adherent patients. If single alternative therapy is not fully effective to reduce AHI and improve symptoms, combined therapy can be also good therapeutic modality in next step

» **RHOP-82 16:20~16:30**

» Effect of long term oral appliance therapy on obstruction pattern in patients with obstructive sleep apnea

*Department of Otorhinolaryngology, Hallym University
College of Medicine*

**Sung min LEE, Sung hee BAE, Kang hyun LEE,
Sang wook KIM, Ho Jun LEE, Dong-Kyu KIM**

Objectives: Oral appliance therapy is an alternative treatment modality for obstructive sleep apnea (OSA). However, there have been no studies to determine whether changes in the obstructive pattern occur following long-term use of oral devices. Therefore, we examined whether the obstructive pattern changes in patients with OSA who

undergo long-term oral appliance therapy using drug-induced sleep endoscopy (DISE).

Methods: We investigated 156 consecutive patients diagnosed with OSA. Seventy-nine of these patients were found to be eligible for inclusion in this study. All enrolled patients underwent two DISE examinations: before and after oral appliance use. We compared the DISE findings for each patient in terms of degree and configuration of airway obstruction at the levels of the velum, oropharynx, tongue base, and epiglottis.

Results: We found that dental problems, as assessed using the average values of overjet and overbite, were significantly decreased after 2 years of oral appliance use. Comparisons of the DISE findings revealed that there was significant widening of the upper airway structures following long-term oral appliance therapy, especially in the velum ($P = 0.022$) and epiglottis ($P = 0.001$). However, changes in the configuration of upper airway obstruction were not observed in any of the structures of the upper airway.

Conclusions: We found evidence possibly indicating decreased obstruction at the levels of the velum and epiglottis after long-term use of oral appliances. We suggest further cohort studies to confirm these findings

» **RHOP-83 16:30~16:40**

» The influence of torus mandibularis on the severity of obstructive sleep apnea

¹Department of Otorhinolaryngology, Yonsei University College of Medicine, ²The Airway Mucus Institute, Yonsei University College of Medicine, ³Korea Mouse Sensory Phenotyping Center, ⁴Medical Research Center, Yonsei University College of Medicine, ⁵Global Research Laboratory for Allergic Airway Diseases

**Sang Hyeon AHN¹, Jin Won KIM¹, Eun Jung LEE¹, Jong-Gyun HA¹, Chang-Hoon KIM^{1, 2, 3, 4},
Joo-Heon YOON^{1, 2, 3, 5}, Hyung-Ju CHO^{1, 2, 3}**

Objectives: Various anatomical structures of the upper airway and physical differences are known for risk

factors for obstructive sleep apnea (OSA). Although torus mandibularis (TM) is a structure that occurs in the mandible, it is thought to affect the position of the tongue and the oropharyngeal airway by affecting the oral cavity. The purpose of this study is to investigate the effect of TM on the severity of OSA.

Methods:We retrospectively analyzed medical records of 232 OSA patients. Subjects with BMI less than 25 were divided into two groups according to the presence or absence of TM. We analyzed demographic finding including age, sex, medical history, previous operation history, physical findings of the upper airway, and a result of polysomnography.

Results:We analyzed 138 patients of the control group and those of 94 TM group. AHI was 18.8 ± 14.9 in control group and 25.1 ± 18.4 in TM group (p-value 0.006). RDI was 23.1 ± 14.7 in the control group and 27.9 ± 18.4 in the TM group (p-value 0.035). Supine AHI showed 26.6 ± 20.3 in the control group and 32.5 ± 22.6 in the TM group (p-value 0.039). In addition, the distribution of patients according to the sleep apnea severity between the two groups also showed a statistically significant correlation with AHI (p-value 0.01) and RDI (p-value 0.024).

Conclusions:We newly found that the presence of torus mandibularis affects the severity of OSA. These results support the necessity of TM evaluation in OSA patients and further investigation on its consequence in the surgical outcome would be required.

» **RHOP-84 16:40~16:50**

» Comparison of jaw thrust maneuver effect between positional and non- positional obstructive sleep apnea patient during DISE

*Department of Otorhinolaryngology, Busan Saint
Mary's Hospital*

**Ji-Seung MOON, Soo-Kweon KOO, Young-
Joong KIM, Tae-Kyung KOH, Ho-Byoung LEE**

Objectives:The purpose of this study was to determine

the effectiveness of jaw thrust maneuver during DISE in patients with sleep apnea.

Methods:We compared clinical characteristics between positional and non- positional OSAS patients and studied upper airway structural changes induced by jaw thrust maneuver in OSAS patients during DISE.

Results:We could see the results according to position between positional and non- positional obstructive sleep apnea patient.

Conclusions:It is well known that sleep position affects the occurrence and severity of sleep apnea. OSAS patients are classified into positional patients with supine apnea-hypopnea index (AHI) that is at least twice as high as the non-supine AHI, and non-positional patients with a supine AHI that does not reach double values of the non-supine AHI. Drug-induced sleep endoscopy (DISE) uses sedative-hypnotics to induce obstruction in OSAS patients, thereby facilitating anatomic assessment of obstructive physiology. DISE is a powerful tool for studying the dynamic airway in a sleeping patient with OSAS. Using the knowledge gained from sleep endoscopy, the surgeon can tailor the operative procedure to the patient's specific condition.

HNKL III

RM 4-3 (Convention C)
Chair : Young Soo RHO

Keynote Lecture

» 10:40~11:10

» Elective neck management in oral cavity cancer

Tata Memorial Hospital

Anil D CRUZ

Cervical node metastasis is one of the most important prognostic factors in the management of oral cancers. The last decade has witnessed many developments that have influenced the management of the neck in these cancers. These include newer technologies namely advances in imaging and the sentinel node biopsy. Our group has been instrumental in generation of level I evidence by way of randomized controlled trial as well as, large prospective studies mapping the patterns of spread that have helped better understanding of regional basins at highest risk of metastasis and helped change some of the long standing beliefs in the extent of neck dissection. There is now convincing evidence that elective neck dissection saves lives in the clinico-radiological negative neck, sentinel node biopsy has limitations to be part of routine practice as of today, and that dissection around the accessory nerve can be spared by avoiding level IIb and V clearance in selected cases. Moreover, tumour biology is an important detriment that needs to be factored into the treatment algorithm of the neck in oral cancers.

HNSP III

RM 4-3 (Convention C)
Chair : Han-Sin JEONG, John In-taek SONG

Cutting Edge in HN Research

» 08:50~09:05

» Dissection of lymph node metastasis and systemic metastasis

*Department of Otorhinolaryngology-Head and Neck
Surgery, Sungkyunkwan University School*

Han-Sin JEONG

Abstract Lymph node metastasis (LNM) in many solid cancers including head and neck cancer (HNC) is a well-known and clinically accepted prognostic factor. However, it has been debated whether LNM reflects tumor aggressiveness or invasiveness or is a foothold for further tumor dissemination. The early concept of a metastatic cascade in solid cancers was the sequential progress of tumors from the primary sites to lymph nodes (LNs) and then systemically distant organs (Halstedian theory). In contrast, the systemic theory of cancer metastasis highlighted the view that cancer is a systemic disease, and cancer cells disperse throughout the body at the very early phase of tumor formation. According to this theory, the status of LNM only provides prognostic information; therefore, surgical removal of metastatic nodes does not affect patient survival. However, many clinical observations of breast, stomach, endometrial, and esophageal cancers have not fit well into these two categories, and a spectrum theory was proposed explaining that tumor cells gain more metastatic capabilities as the tumor progresses to regional LNs. Halstedian theory does not accept the direct dissemination of tumor from primary tumor to systemic sites; however, the spectrum theory describes systemic tumor dissemination both from primary tumors and LNM, but supposes that tumor cells spread more to

systemic sites from LNM, which can be a major source of systemic disease. In HNC, there have been no clear data, but similarly the active control of regional as well as local diseases is recommended for better survival of HNC patients [National Comprehensive Cancer Network (NCCN) Clinical Practice Guideline in Oncology, Head and Neck Cancer]. Molecular and genetic characteristics of cancer cells can be the main determinants of metastasis in HNC, and the active dissemination to blood and lymphatic vessels in the primary tumor was suggested. However, the relative significance of the established LNM in further cancer dissemination of HNC has never been studied fully. Regional LNM is a major prognostic factor for HNC, because it indicates aggressive tumor biology, as well as represents a source of subsequent metastasis (as explained by the spectrum theory). In addition, the tumor biology and phenotype within the primary site microenvironment can differ from those of the metastatic LNs. More importantly, tumor cells in different microenvironments have been reported to respond differently to therapy. Thus, increasing evidence indicates that to determine optimal treatment and to better predict prognosis, evaluation of cancer patients should be refined on the basis of the primary tumor and metastatic microenvironment. Recently, our groups and others demonstrated that cancer cells can be a source of distant metastases experimentally. In addition to a proposed route in which lymph node metastases spread through efferent lymphatic vessels, in-vivo imaging data identify an additional route of dissemination to distant organs through invasion of lymph node blood vessels, circulation in the blood and colonization of the lung. Genetic studies examining the clonal relationships between cancer cells in the primary site, lymph nodes and distant organs have shown distant metastases are more closely related to lymph node metastases than to primary tumors in a subset of mice and patients. Thus, it is time to take note of the critical role of lymph node metastasis in cancer progression, treatment decision and selection of treatment modalities. [END]

» 09:05~09:20

» Development of stem cell based cell therapy for regeneration of parathyroid gland

*Department of Otorhinolaryngology – Head & Neck
Surgery, Ewha Womans University College of
Medicine*
Han Su KIM

The incidence of thyroid cancer has become epidemic in developed countries. Thyroid cancer has been most common cancer in Korea. Thyroidectomy is well-established and safe procedures, though, collateral morbidities, such as injury of parathyroid glands, are not uncommon. Several different methods have been used clinically in the managing of hypoparathyroidism.; autografting of parathyroid tissues discarded from patients during surgery, daily intake of multiple mega-doses of calcium and vitamin D for a remarkably long time, and daily injection of the synthetic PTH. These managements have several drawbacks. To restore damaged parathyroid function, parathyroid tissue engineering has been rising as new treatment approach. It was previously reported that human embryonic stem cells (hESC) and trans-differentiated thymic stromal cells could be used for the in vitro regeneration of parathyroid-like cells. However, these cells have critical limitations for clinical use, including ethical issues associated with the use of hESC and the considerably long time (~10 weeks) required for trans- differentiation of thymic stromal cells into PTH-secreting parathyroid-like cells. To overcome these limitations, we recently introduced human tonsil- derived mesenchymal stem cells (TMSC) for in vivo parathyroid tissue regeneration. TMSC differentiated into parathyroid like cells in 7 to 10 days, shorter than that of thymic cells. Differentiated TMSC(dTMSC) release parathyroid hormone (PTH) which is responsive to extracellular calcium levels. We also developed 'hypoparathyroidism animal models' with rat. dTMSC showed almost complete recovery of survival rates and restored serum levels of PTH and iCa²⁺ in our animal

model (parathyroidectomized rats fed calcium-free diet).

» 09:20~09:40

» Use of a novel PET tracer to assess response to anti-PD-1 antibody checkpoint blockade in head and neck squamous cell carcinoma

Dep. of Otolaryngology, Stanford University School of Medicine

John B SUNWOO

Immune checkpoint blockade with anti-PD-1 antibody has demonstrated remarkable responses in a subset of patients with head and neck squamous cell carcinoma (HNSCC) and other solid tumors. However, responses occur in only a minority of HNSCC patients. Currently, there are no good biomarkers to predict responses, and methods to monitor and assess responses, after patients have initiated therapy, are extremely limited. We are evaluating the ability of a novel PET metabolic tracer, that preferentially accumulates in activated CD8+ T cells, to assess response to PD-1 checkpoint blockade. We hypothesize that uptake of this agent within the tumor will correlate with the accumulation and activation of T cells within the tumor microenvironment. In this study, locally advanced HNSCC patients undergoing definitive surgical resection received an infusion of anti-PD-1 antibody in a window-of-opportunity study at Stanford University. A novel radiofluorinated AraG imaging agent, [18F]F-AraG (Cellsight), was used to image patients by PET/CT before and 2-3 weeks after their infusion of anti-PD-1 antibody. The tissue volume of interest (VOI) for the pre- and post-infusion [18F]F-AraG PET/CT scans was defined using pre-treatment conventional FDG-PET/CT scans. To assess for correlation of the [18F]F-AraG signal in the VOI with immune response, pre- and post-infusion samples of the patients' tumors were obtained and dissociated into cell suspensions. Tumor-infiltrating T cells were evaluated by flow cytometry to determine T cell infiltration and activation. In this presentation, preliminary results of this

trial will be discussed.

» 09:40~10:00

» The role of the oral microbiome in head and neck squamous cell carcinoma

Department of Otorhinolaryngology, Head and Neck Surgery, The Chinese University of Hong Kong

Jason CHAN

The human mouth harbors one of the most diverse microbial communities in the human body, termed human oral microbiome (HOM), which has been linked with both oral and systemic disease including diabetes, cardiovascular disease and pre-term birth. A recent report determined a significant loss in richness and diversity of oral microbiota species in HNSCC patients ($p < 0.05$) compared to the normal epithelium controls. Given the increasing evidences indicating a key role for the bacterial microbiota in carcinogenesis, determination of human oral microbiome may explain, in part, why a small minority of oncogenic HPV infections or other risk factors do not establish and progress the precancerous lesions and neoplasms in the oral cavity. The complexity of cofactors driven by the dynamics of oral microbiome and other epidemiological risk presents a very important environmental exposure that we and other research community are now exploring as the tools to reveal underlying pathogenic mechanisms associated with host-microbiome dysfunction.

» 10:00~10:20

» MiRNA in the diagnosis and surveillance of head and neck cancer

University of Colorado School of Medicine, University of Colorado Hospital, Department of Otolaryngology

John In-taek SONG

One of the main reasons for the poor prognosis of HNSCC is that by the time of diagnosis, more than half of HNSCC

patients have locoregionally advanced disease. Therefore, early detection may be key to improving survival rates in the future. MicroRNAs (miRNAs) are a class of non-coding small RNAs, which negatively regulate gene expression at the post-transcriptional level. We have previously reported that DNA methylation of miR9 specifically occurred in a subset of human HNSCC tissue samples. In this study, we have shown that DNA methylation at the genomic loci encoding miRNA (mgmiRs) represents a novel class of modification and could be used for early detection of human cancer including HNSCC. We screened and selected mgmiRs in both cell lines and tissues from HNSCC patients and normal controls using a panel of seven mgmiRs, [i.e. 9-1, 124-1, 124-2, 124-3, 129-2, 137 and 148a] in an expanded patient's cohort, including 189 HNSCC tissues and 92 control tissues. The translational application of this panel of mgmiRs was further evaluated in saliva from 86 HNSCC patients, and 108 control patients. This study demonstrates the potential of miRNA as novel biomarkers for human cancer detection and surveillance.

HNSP IV

RM 4-3 (Convention C)

Chair : Kyung TAE, Soe TIN

Minimally Invasive HN Surgery

» 11:10-11:25

» Minimally invasive organ & functional preservation surgery for T3, T4 oropharyngeal cancer

*Department of Otorhinolaryngology, Yonsei University
College of Medicine, Seoul, Korea*

Se-Heon KIM

Objective: We conducted a prospective clinical trial of combination neoadjuvant chemotherapy, transoral robotic

surgery, and customized adjuvant therapy in patients with locally advanced oropharyngeal cancer.

Materials and Methods: A total of 102 patients with oropharyngeal cancer visited the Yonsei Head-and-Neck Cancer Center between July 2009 and October 2016, 31 of whom were enrolled in this clinical trial.

Results: The primary lesions were located in the tonsils in 27 patients and in the base of the tongue in 4. Sixteen patients (51.6%) were T3 and 15 patients (48.4%) T4a. Three patients (9.7%) had stage III and 28 (90.3%) stage IV disease. The 5-year overall survival rate was 78.7%, the 5-year disease-specific survival rate was 85%, and the 5-year disease-free survival rate was 80.8%. At the final follow-up, 26 patients were alive with no evidence of disease, and 1 was alive with disease. Four patients died during the study: two from TNM-related disease and two from another condition. All patients were tolerable to an oral diet at an average of 7.4 days postoperatively. Upon subjective swallowing evaluation using the functional outcome swallowing scale score, 83.9% of patients exhibited favorable outcomes. No patient was permanently dependent on a feeding tube. All patients breathed and phonated in the absence of a permanent tracheotomy at the final follow-up evaluation.

Conclusion: Our treatment strategy afforded good oncological and functional outcomes in patients with locally advanced oropharyngeal cancer. Although future large-scale multicenter studies with longer follow-up intervals are needed, we have shown that neoadjuvant chemotherapy combined with TORS is useful for treating advanced oropharyngeal cancer.

» 11:25-11:45

» Radiofrequency ablation of benign thyroid nodules in ORL-HNS Hospital, Yangon, MYANMAR

ORL-HNS Department, University of Medicine(1)

Yangon, MYANMAR

Maung Maung KHAING

Introduction: Nodular goiter is one of the most common benign lesions in thyroid nodule. The main treatment of the disease is still the traditional surgical resection, however there are many problems such as general anesthesia, surgical scar, postoperative thyroid or parathyroid function abnormalities, and high nodules recurrence rate in residual gland. Radiofrequency ablation (RFA) is a minimally invasive technique and serves as an alternative to surgery for the management of benign thyroid nodules.

Aim: The aim of this study was to evaluate the efficacy of radiofrequency ablation (RFA) for benign thyroid nodules and assess the usefulness of internal factors (ultrasonographic findings) and external factors (treatment-related findings) in prediction of treatment efficacy.

Method: We evaluated 54 benign thyroid nodules from 54 patients treated with RFA between October 2015 and June 2017. Ultrasound guided FNAC was done before RFA and the internal and external factors of these nodules were retrospectively reviewed and correlated with the therapeutic success and the volume reduction ratio (VRR).

Conclusion: RFA is an effective in decreasing the volume of benign thyroid nodules without complications.

» **11:45-12:05**

» **Prevention and management of complications of endoscopic/robotic nasopharyngectomy**

University of Hong Kong
Raymond TSANG

Endoscopic/robotic nasopharyngectomy represented the evolution of minimally invasive surgery in the nasopharynx and should have less morbidities than open procedures. Unfortunately, endoscopic/robotic nasopharyngectomy is not without complications, especially when most patients had prior radiation to the operative field. Ear complications – Eustachian tube cartilage is commonly resected for salvaging recurrent nasopharyngeal carcinoma (NPC). This can lead to otitis media with effusion

(OME). The incidence can be up to 40%. Myringotomy and grommet insertion was previously offered to manage the OME but the long term tympanic perforation rate is over 35% and lead to a more conservative approach recently. Osteoradionecrosis of skull base – Resection of the nasopharynx mucosa exposed the underlying radiated sphenoid and clivus bone, leading to infection and radionecrosis of the skull base. The incidence can be up to 40% of patients. Treatment is difficult. Coverage of with vascularized tissue like the nasoseptal flap can prevent the condition. Palatal fistula – The soft palate frequently need to be split in TORS nasopharyngectomy. Inappropriate closure of the palate can lead to palatal fistula formation. Careful close of the palatal wound is required to minimize the risk of palatal fistula. The use of non-palate splitting approaches shall minimize the risk of this complication. Trismus – Resection of medial pterygoid muscles can lead to fibrosis and subsequent trismus. Mouth opening exercise can prevent trismus development.

» **12:05-12:20**

» **Future of robotic surgery**

Yonsei University, Seoul, Korea

Yoon Woo KOH

Recent advances in technology has urged the introduction of surgical robotics in the field of head and neck surgery and changed the landscape indefinitely. Major applications of robotics in head and neck surgery were transoral robotic surgery (TORS) and robotic thyroidectomy which have been propagated worldwide. The robotic thyroidectomy has a distinct difference to other minimally invasive surgeries since it adopts a gasless transaxillary (TA) technique. Conversely, robotic applications to other neck surgeries such as SMG resection or neck dissection were still in its infancy stage. Based on the initial reports of Terris on robotic facelift thyroidectomy and our extensive surgical experience on TA endoscopic thyroidectomy, we have actively utilized the retroauricular (RA) approach in head

and neck surgery and developed many operative techniques of robotic head and neck surgery including Benign mass excision, Thyroidectomy, and Neck dissection. However, it's not the end of Robotic HN surgery.

Regarding Future of Robotic Surgery, many robotic companies are building a digital surgery platform that combines robotics, advanced visualization, advanced instrumentation, data analytics and connectivity. We can utilize Flixible robotic system with single port and IGS (imaging guided surgery) can enhance our ability to differentiate the tumor from the normal tissue.

During this talk, future of surgery will be mentioned. Also, what is the role of HN surgeons in the era of 4th Industrial revolution would be discussed.

» 12:20-12:40

» The trans-hairline approach for robotic surgery of head neck

National Taiwan University
Tsung-Lin YANG

Surgery has regarded as the mainstream of treating many diseases of head and neck. Conventional open surgery results in obvious scars on the head and neck. Compared with open and endoscopic methods, robotic surgery provides more appealing surgical approaches and techniques for esthetic concern. Here we demonstrate the feasibility and efficacy of performing robotic surgery for head and neck diseases through the trans-hairline approach. Robotic surgery could be successfully performed in all enrolled patients by the trans-hairline approach. For head and neck tumors, complete tumor removal was achieved by robotic surgery through the trans-hairline approach. Neither operative complications nor postoperative neurological deficits were found. The esthetic outcome was maintained by concealing the scars within hairs, leaving no visible scars over the neck and post-auricular areas. No recurrence was noted in the follow-ups. Our results indicate that the trans-hairline approach is a feasible surgical method of robotic

surgery for head and neck surgery, serving as a useful alternative to conventional techniques with potential safety and esthetic merits

HN SP V

RM 4-3 (Convention C)

Chair : Kwang-Yoon JUNG, Iwao SUGITANI

Current Issue of Thyroid Gland

» 13:30-13:45

» Change in incidence of thyroid cancer in Korea and its implications

*Dept. of Otorhinolaryngology, Center for Thyroid
Cancer, National Cancer Center*
Yuh-Seog JUNG

The increasing incidence of thyroid cancer is a phenomenon commonly observed in various countries worldwide. These increases are mostly due to the increase in papillary carcinoma, but the frequency of other types of follicular sphincter such as follicular carcinoma has not changed. In contrast, WHO data showed that the mortality rate of thyroid cancer was decreasing in both men and women. In Korea, age standardized incidence rate from 1999 to 2012 has increased by 1000%, showing an unprecedented epidemic in the world. This increase is interpreted mostly due to the increase of ultrasound - based detection. However, there is still a lot of controversy about why thyroid cancer in South Korea is increasing so steeply. There should be many studies and controversies to answer this. The most common risk factors for thyroid cancer are radioactive iodine 131, X-ray, gamma ray, and obesity. These etiologies could be suspected for this increase, but there has been little confirmative evidence so far. Although the prevalence of ultrasound screening is currently being considered as the main cause of thyroid cancer, there is a lot

of controversy as to whether the development of ultrasound screening test is the only cause of thyroid cancer. From 1983 to 2006, the number of thyroid cancer increased in the United States, as well as the initial cancer around 1 cm, as well as the progressive cancer of more than 4 cm that was not directly associated with ultrasound screening. Thus, the increasing incidence of clinically detectable thyroid cancer, regardless of screening, suggests that prevalence of screening does not account for all aspects of thyroid cancer growth. In addition, the incidence of PTC in children and 20s who are not candidates for screening is also increasing. In summary, the causes of the global increase in thyroid cancer remain unclear at present, and the controversy is currently underway, and direct evidence from several studies needing further studies.

» 13:45-14:00

» Moving surgeons stance to the most common thyroid cancer, T1 papillary carcinoma

Dep. of Endocrine Surgery, Nippon Medical School
Iwao SUGITANI

The majority of papillary thyroid carcinomas (PTCs) are categorized into low-risk group with an excellent prognosis according to the recent risk- group classification systems. Most patients with low-risk PTC have usually been treated with lobectomy in Japan. This has been a very different approach from those of Western practices, where the majority of patients are treated with total thyroidectomy followed by radioactive iodine treatment. Given the excellent overall survival and lower risk of surgical complications, the 2015 American Thyroid Association (ATA) guidelines eventually adopted the limited surgical approach for patients with low-risk PTC under a “risk-adapted management” as the golden rule. In the last few decades, the incidence of thyroid cancer has continuously increased all over the world. This is mainly due to the increased detection of small PTCs by more sensitive diagnostic procedures. Increased detection and

surgery of these carcinomas did not result in decrease of the mortality from thyroid cancer. There is an emerging debate on overdiagnosis and overtreatment of subclinical thyroid cancers. In Japan, we have had a consensus that there is no merit to detect subclinical PTCs in mass screening. Thus, the increasing incidence of thyroid cancer in Japan has not been so remarkable compared to other countries. Moreover, as for asymptomatic papillary microcarcinoma (PMC), two institutions have conducted prospective trial of active surveillance since the 1990s. A few patients with PMC developed tumor enlargement or lymph node metastasis; however, overall safety of the strategy has been verified. The 2015 ATA guidelines endorsed an active surveillance approach for very low-risk PTC as an alternative to immediate surgery. Pioneers of Japanese thyroid surgeons have selected a conservative way of treatment in an attempt to maintain quality of life. Such approach is now affecting and changing the attitude toward the disease worldwide.

» 14:00-14:15

» The practical issues in the management of thyroid swellings

Victoria Hospital, Yangon, Myanmar
Soe TIN

Thyroid disease is common and yet the management of both thyroid swellings and functional abnormalities remains controversial. Many aspects of thyroid management have not been subjected to randomized controlled clinical trials and most treatment protocols have been based on personal experience or retrospective studies. There are four main clinical groups of patients presenting with the thyroid; with diffuse enlargement, with nodules, with cystic swellings and with Thyrotoxicosis. Whatever the types of presentation, the essential goals of management are directed to removal of complaints, eradication of underlying disease, patients safety, prevention of recurrence and cosmetic outcome. To accomplish the above goals, many practical issues are involved in the management of Thyroid swellings

namely; critical risk factors, diagnostic issues, hormonal suppression therapy, differentiation between benign from malignant condition, management models, prevention of morbidity and cosmetic issue. Based on these challenging issues, widely diversified protocols from different thyroid associations have been published. This paper addresses the possibility of developing protocols that may be acceptable to a wide range of thyroid clinicians, with the aim that development of such protocols, based on study of various protocols, consensus opinions combined with my practical experiences and studies may facilitate patient management and outcome audit.

» 14:15-14:30

» EMG signal loss and RLN injury during monitored thyroidectomy- evaluation and management

*Dep. of Otorhinolaryngology, Kaohsiung Municipal
Hsiao-Kang Hosp., Kaohsiung Medical Univ. Hospital,
Kaohsiung Medical Univ.*

Che-Wei WU

Intraoperative injury to the recurrent laryngeal nerve (RLN) can cause vocal cord paralysis, which interferes with voice and can potentially interfere with breathing. One major change in thyroid surgery in the past decade is the widespread use of intraoperative neural monitoring (IONM) to identify the RLN adjunct to the standard practice of visual identification. With the application of IONM, the surgeon can evaluate the real-time functional status of RLN. At times there may be partial or total loss of nerve conduction to nerve stimulation indicating RLN stress or injury has occurred, the surgeon can also evaluate the surgical maneuver that produced the impending or actual RLN injury. By elucidating the mechanism of RLN injury and the surgical pitfalls, IONM can help surgeons to improve the surgical techniques, predict the recovery outcome, and plan intra- and post- operative management. This talk gives an overview on the evaluation and

management of EMG signal loss and RLN injury during monitored thyroidectomy.

» 14:30-14:45

» Present-day advanced technology and techniques of thyroid operation:Focus on novel IONM

*Department of Otorhinolaryngology, Pusan National
University Hospital*
Byung-Joo LEE

Recently, several techniques have been developed to reduce complications in thyroid surgery. They are some techniques to reduce the hypoparathyroidism by identifying the parathyroid gland and the nerve damage by identifying the recurrent laryngeal nerve during thyroid surgery. We would like to present the development of a novel intraoperative neuromonitoring (IONM) system to reduce nerve related complications for thyroid surgery. The principle of conventional IONM system is to use the electromyography (EMG) of the muscle to give an electric stimulus to the structure suspected to be a nerve. The conventional IONM system requires a neural probe that can provide electrical stimulation separately from a surgical instrument. However, nerve injuries can be occurred during IONM when the structure can't be predicted the possibility of the nerve due to hemorrhage or positional displacement. For these unpredictable nerve location, conventional IONM system has a limitations in preventing nerve damage. Thermal damage caused by an energy-based surgical instruments (Harmonic, Ligasure, Thunderbeat) is one of important causes of nerve injury during thyroid surgery. Also the conventional IONM system is divided into a surgical instrument and a nerve stimulating probe to identify the nerve. Therefore, it is troublesome to change the instrument from the surgical instrument to the nerve stimulating probe in order to identify the nerve repeatedly. In order to solve the above problems, we developed a nerve stimulator probe that can be attached to and detached from all surgical instruments to easily identify the nerve

during thyroid surgery. Since it is possible to attach and detach to all surgical instruments such as general metal type surgical instrument, endoscopic surgical instrument, and robotic surgical instrument, it is not necessary to change from surgical instrument to nerve probe to identify the recurrent laryngeal nerve. Recently, energy devices surgical instruments are widely used during surgery for rapid operation and easy hemostasis, and thermal damage to the nerve is a problem. These energy devices can also be connected to a nerve stimulating probe to identify the recurrent laryngeal nerve during thyroid surgery. The method of measuring the laryngeal muscles by nerve stimulation with electromyography is disruptive to electromyographic detection by changing the position of the tracheal tube or by much saliva or sputum. In addition, there is a disadvantage that both EMG electrodes must be attached in vocal fold for accurate EMG measurement. I will present about the development of novel IONM system that can detect the movement of the vocal cord muscle using the surface pressure sense, not the EMG.

» 14:45-15:00

» Diagnostic procedure of neck disease found incidentally in thyroid ultrasound examination

*Dep. of head and neck surgery, Kanagawa Cancer
Center*

Madoka Kaneko FURUKAWA

The recent advances in ultrasonography could make it possible to gain much information, and to assess the findings with visualization of tissue constructions, organ movements and fine blood flow, and Surgeon Performed Ultrasound (SUS) has become a popular and valuable tool. Since otolaryngologist / head and neck surgeon must examine not only thyroid but also every parts in head and neck, a complementary examination of every part of head and neck other than thyroid gland should be recommended on the thyroid ultrasound examination as SUS. The standardization of head and

neck ultrasonography is important to make head and neck ultrasonography confident. The method and technique of systematic ultrasound for screening on the wide area of the neck and the diagnostic procedure of many kind of neck diseases which found incidentally in thyroid ultrasound examination must be established. The head and neck ultrasonography is contributing to medical improvement of otolaryngology-head and neck surgery. Its usefulness as a primary care ultrasonography (point of care ultrasonography: POCUS) for the patients with head and neck tumor should be indispensable for the diagnosis and treatment plan for salivary gland tumor, distinction of lymphoma, lymph node metastasis from the head or neck area and the other organ malignancy.

HNSP VI

RM 4-3 (Convention C)

Chair : Kumud Kumar HANDA, Sung Min JIN

**The Changing Fields of Laryngopharyngeal
Reflux: Speculations as to the Future**

» 15:20-15:40

» Do laryngopharyngeal findings reflect the characteristics of reflux

*Chairman Deptt of ENT & Head Neck Surgery,
Medanta Medicity, Gurgaon*
Kumud Kumar HANDA

Laryngopharyngeal reflux disease (LPRD) is an inflammatory condition defined as the backflow of gastric contents into the laryngopharynx, where it comes in contact with the tissues of the upper aerodigestive tract. It is an accepted and common cause of patients having hoarseness of unknown origin and non specific throat symptoms like cough, throat irritation, foreign body sensation etc This 20 minute talk tries to coorelate whether the laryngeal findings in patients suspected of reflux correlate and reflect

the severity and type of reflux. Laryngoscopic examination including 70 degree telescopy, video stroboscopy and flexible laryngoscopy are done to examine the patients included in the study based on reflux symptom index

» 15:40-15:55

» Diagnosis of LPRD utilizing 24-hour multichannel intraluminal impedance (MII) pH monitoring

*Department of Otolaryngology-head and neck surgery,
Kyung Hee University*
Young-Gyu EUN

The prevalence of laryngopharyngeal reflux disease (LPRD) has been increasing since the 1990s. The healthcare burden of patients who primarily have LPRD is estimated to be 5 times that of patients with primarily heartburn and regurgitation due to lack of a gold standard diagnostic test, poor responsiveness to PPI therapy, and delay in recognition. Empiric twice daily PPI therapy for 1–2 months is currently considered the best diagnostic test, but due to poor responsiveness to PPIs in patients with LPRD in multiple randomized controlled trials, newer modes of diagnostic procedures such as oropharyngeal pH monitoring have gained significantly more traction. Until recently, 24-hour ambulatory pH monitoring has been considered as standard diagnostic test for gastro-oesophageal reflux. However, its role in diagnosing LPRD remains controversial, as there is no consensus neither for the adequate site of the upper pH-probe nor for the interpretation of the results. In addition, it is limited to detect only acid reflux and not weakly acidic reflux which is also associated with laryngopharyngeal symptoms. 24-hour combined multichannel intraluminal impedance–pH (MII-pH) recording detects both acid reflux and non-acid reflux, but also determines the composition (liquid, gas and mixed liquid–gas) and the height reached by the refluxate. We will discuss about the diagnosis of LPRD using 24hr MII-pH monitoring.

» 15:55-16:15

» Implementing pH-Impedance testing before prescribing PPIs in suspected LPR minimizes overall treatment costs

Harvard Medical School
Thomas L CARROLL

Empiric proton pump inhibitor (PPI) trials for suspected laryngopharyngeal reflux (LPR) are common and contribute the estimated 50 billion dollars spent annually in the United States on the workup and treatment of LPR. While most patients with suspected LPR will respond to acid suppression, concerns about side effects, unnecessary and prolonged PPI exposure and costs associated with PPI use are now at the forefront of both patients' and physicians' minds. Once daily 40 mg omeprazole and once nightly 300 mg ranitidine (QD/QHS) as an alternative regimen appears to be effective in 50% of patients who would ultimately improve on acid suppression. Thus, QD/QHS reduces the PPI burden and may improve compliance. Approximately 25% of all patients suspected of having LPR do not have an acidic refluxate and thus never would respond to PPI. Testing patients suspected of having LPR with pH impedance and high resolution manometry before empiric acid suppression trials appears to minimize costs. This data will be presented in addition to ideas on improving our diagnostic accuracy for patients suspected of having LPR and what to do with those who have non-acid LPR.

» 16:15-16:30

» Pepsin revisited: Effects of pepsin on normal laryngeal epithelial cells

Department of Otorhinolaryngology-Head and Neck Surgery, Sungkyunkwan University School of Medicine, Kangbuk Samsung Hospital
Sang-Hyuk LEE

Laryngopharyngeal reflux (LPR) refers to the retrograde flow of gastric contents into the laryngopharynx, and proton pump inhibitors (PPIs) are gold standard for the first treatment option. However, many LPR patients have persistent symptoms despite prolonged PPIs treatment and it has been reported that 20~30% of LPR patients treated with PPIs are unresponsive to these drugs. The reason for this refractory response to PPIs is might be the non-acidic contents of the reflux episodes. With refluxate known to include pepsin and bile acids, and pepsin is historically central to this discussion. Pepsin is a proteolytic enzyme produced only in the stomach, initially secreted in zymogen form as pepsinogen by gastric chief cells. Pepsin is known to be produced only by gastric chief cells, so pepsin detected in sputum and saliva of LPR patients was presumably deposited from a reflux event, thus it can be used as a specific marker for reflux. Pepsin was detected in laryngeal epithelial biopsy samples from 89% patients with LPRD but in none of the controls. The acidified pepsin plays a key role in the development of reflux laryngitis by producing an early irreversible lesion. There is no doubt that pepsin will be more injurious to the laryngeal epithelium in acidic conditions. However, previous study reveals that it could also cause damage in nonacidic conditions. Pepsin is taken up within the cells by endocytosis through a competitive receptor-mediated mechanism and is found in vesicles located in the region of the Golgi system. Even in nonacidic conditions, endocytosed inactive pepsin can be reactivated within the cells, and causes cell damage. This induces oxidative stress and the accumulation of free oxygen radicals which, in turn, damage mitochondria and may lead to cell death. Exposure of hypopharyngeal cells to pepsin in a nonacidic environment induces the expression of several proinflammatory cytokines and receptors. These data indicate that refluxed pepsin may contribute to laryngeal inflammation associated with nonacidic gastric reflux. One recent study demonstrated that cytokines previously associated with chronic rhinosinusitis, IL-1A and IL-6 were elevated and the damaging effect of pepsin on mitochondria in nasal epithelial cells at nonacidic condition (pH 7.0).

The other study also shows that chronic stimulation of normal human hypopharyngeal cells with combinations of pepsin in acidic condition (pH 4.0) is not capable of activating the NF- κ B related oncogenic pathway in vitro but at a less acidic condition (pH 5.0 and 7.0) induces mild activation of NF- κ B, which subsequently leads to a mechanism of either cell-cycle arrest or nonspecific stress controlled cell survival. The role of pepsin in LPR events remains unclear and the molecular events after exposure of pepsin in laryngeal epithelial cells need to be studied. We established a human immortalized posterior commissure laryngeal epithelial cell line as an in vitro model for reflux research. This cell line will provide a powerful new tool for investigating the effects of pepsin in the human larynx, as well as a useful model to analysis of the relationship between pepsin, reflux, and the development of laryngeal cancer. We performed immunofluorescent staining of pepsin in nonacidic condition (pH 7.0) and found pepsin entry into in the laryngeal epithelial cells. Our preliminary data demonstrate that pepsin exposure even in non-acidic conditions, can lead to several inflammatory genes (CCL20, CCL26, IL-1 α , IL-5 and IL-8) expressions in the laryngeal epithelial cells. Pepsin may contribute to laryngeal epithelial cell damage and inflammation in non-acidic reflux and help explain why many patients have refractory symptoms even after PPI treatment. Pepsin as a promising reflux marker and new treatment target for LPR, further study will be needed to elucidate exact mechanisms.

» 16:30-16:50

» Novel therapeutic for reflux disease which specifically targets pepsin

Dept. Otolaryngology, Medical College of Wisconsin

Nikki JOHNSTON

Extra-esophageal (EER) reflux is suspected to cause a wide range of clinical symptoms in the upper airways. Diagnosis and treatment has focused on acid, but realization of the role of nonacid reflux has resulted in research investigating

the use of pepsin as a biomarker for gastric reflux and aspiration. Pepsin analysis can complement the use of questionnaires and office based diagnosis and lessen the dependency on invasive and expensive diagnostic tests. Furthermore, pepsin as a first line diagnostic biomarker has been shown to improve the accuracy of reflux diagnosis. In addition to its use as a diagnostic biomarker, pepsin has been shown to cause inflammation, independent of the pH of the refluxate and thus despite acid suppression proton pump inhibitor (PPI) therapy. Given pepsin's role in nonacid laryngopharyngeal reflux (LPR), it has been proposed as a novel therapeutic target, especially for patents experiencing refractory symptoms on PPI therapy. Approximately \$26 billion/year is currently spent on PPIs for the treatment of LPR alone, despite their poor efficacy for this patient population. The promise of irreversible inhibitors and/or receptor antagonists as potential new therapeutics for LPR have been discussed in the literature. It should be noted that while the commercially available inhibitor of pepsin, Pepstatin A, is a potent inhibitor, it does have poor water- soluble characteristics and poor pharmacokinetic properties. Our group are performing preclinical evaluations of new pepsin inhibitor compounds as a novel therapy for airway reflux.

HNOP VIII

RM 4-3 (Convention C)

Chair : Si Youn SONG, Jin ho SOHN

Larynx cancer

» **HNOP-41 08:00~08:10**

» Oncologic outcome of early glottic cancer patients -review of 20- year experience in a single institution

*Department of Otorhinolaryngology-Head and Neck
Surgery, Sungkyunkwan*

**Eun-Kyu LEE, Nayeon CHOI, Eun-Hye KIM,
Young-Ik SON**

Objectives:We reviewed the oncologic outcome of the patients who were treated at Samsung Medical Center for their early glottic cancer during the last 20 years.

Methods:Five hundred ten patients were included for this study, who were diagnosed as a T1N0 or T2N0 glottic squamous cell carcinoma and firstly treated at Samsung Medical Center, Seoul, Korea, since 1994. The patients were divided into two groups; surgery-based (OP) treatment and radiation-based treatment (RT). The clinical characteristics, disease-free survival (DFS) and overall survival (OS) were compared between the two groups.

Results:The age and gender distribution were not significantly different between the two groups. ($P>0.05$) Regarding T-stage, proportion of T1/T2 was 88.0%/12.0% and 76.5%/23.5% in the OP and RT group, respectively. Treatment failure was observed in 16% ($n=40/250$) of OP group and 26.9% ($n=70/260$) of RT group ($P=0.034$). Local recurrence was the most common pattern of failure for both OP and RT group ($n=26/40$, 65% and $n=44/70$, 63%). In Kaplan-Meier survival analysis, 5-year DFS rate was significantly better in OP group than RT group ($P=0.049$). However, 5-year OS rate was not different. In multivariate logistic regression analysis, treatment modality

(OP vs. RT) was the only significant risk factor for the recurrence ($P=0.035$, $HR=1.648$)

Conclusions: Retrospective analysis of 510 early-stage (T1N0, T2N0) glottic cancer patients showed that surgery-based treatment provides better DFS than radiation-based treatment.

» **HNOP-42 08:10~08:20**

» Thyroid gland invasion in T3 and T4 laryngeal carcinoma

Faculty of Medicine, Cairo University, EGYPT

Mohamed HEGAZY, Mohamed SALAH, Ahmed EL FAROUK, Osama HASSAN

Objectives: To assess factors favoring thyroid gland invasion (TGI), indications of hemithyroidectomy, and postoperative complications.

Methods: It is a prospective analytical study that included 40 patients who were diagnosed T3 or T4 laryngeal carcinoma and had total laryngectomy with at least hemithyroidectomy. The incidence of thyroid gland invasion was reported histopathologically in laryngeal carcinoma and correlated with site and stage of the primary tumor, vocal cord fixation, subglottic extension, and prior radiation.

Results: Our study included 40 patients, 37 were males. Four male patients (10%) had thyroid gland invasion by laryngeal carcinoma, two cases (5%) had colloid nodules and one case (2.5%) had follicular adenoma. Thyroid cartilage invasion was evident in all 4 cases (100%) with TGI which was of statistical significance (p value = 0.026). Of the 4 cases with TGI, three cases (75%) were transglottic carcinomas, and one case (25%) was glottic carcinoma, all were T4a staged 100%. All cases (100%) with TGI had unilateral fixed vocal cord, infiltrated anterior commissure, and unilateral subglottic extension >1cm. Postoperative complications occurred in 28 cases (45%). Three cases with TGI (75%) developed complications.

Conclusions: Histological thyroid gland invasion by

advanced tumors must not be underestimated. We suggest subglottic and transglottic tumors more prone to TGI. We found thyroid cartilage invasion and preoperative CT findings of thyroid gland were statistically correlated with TGI.

» **HNOP-43 08:20~08:30**

» The true incidence of thyroid metastasis occurrence with laryngeal malignancies: does it really deserve its routine removal with advanced laryngeal malignancies?

*Dep. Of Otorhinolaryngology, Kasr Alainy Hosp.,
Faculty of medicine, Cairo Univ.*

Ahmad ELTELETY, MD, Ahmed EL BATAWI, MD, Ahmed NASSAR, Sherif G IBRAHIM, MD

Objectives: Due to the close proximity of the thyroid gland to the larynx and pharynx, its management is still controversial in advanced laryngeal and hypopharyngeal carcinoma. Varying between total or hemithyroidectomy which is performed in cases of direct invasion to the thyroid gland, subglottic extension and apical invasion of the piriform sinus. The literature reported high incidence for postoperative hypothyroidism and hypoparathyroidism in such group after surgery alone and also when combined with irradiation. Additionally, patients are at risk of increasing surgical morbidity when thyroid gland is included in surgery for laryngeal carcinoma. In this review, we are sharing our experience at Cairo University Hospitals which we gained over the last seven years.

Methods: Medical records of more than 500 patients with advanced laryngeal malignancy were retrospectively reviewed. Data analyzed included the site of the primary tumor, types of neck dissection, occurrence of thyroid infiltration whether by direct invasion or metastatic deposit or synchronous thyroid malignancy.

Results: Twenty cases of direct invasion of T4 laryngeal carcinoma to the thyroid gland. One case of T3 laryngeal carcinoma with metastatic thyroid nodule. Three cases of

papillary thyroid carcinoma with direct laryngeal invasion. One case of follicular thyroid carcinoma with direct laryngeal invasion. One case of papillary thyroid carcinoma with laryngeal metastatic deposit. Two cases of synchronous malignancy.

Conclusions: Metastatic deposits in the thyroid is uncommon. Thyroid invasion is mainly through direct infiltration by adjacent malignancy. Total thyroidectomy seems to be unnecessary and maybe an over treatment for the patient and this practice has to be reviewed. Hemithyroidectomy maybe the appropriate procedure which is preserved for thyroid lobes with intra- lobar suspicious pathology or adjacent to an extra laryngeal tumor extension.

» **HNOP-44 08:30~08:40**

» **Thyroid and parathyroid dysfunction after total laryngectomy**

Dep of Otorhinolaryngology, Cairo Univ., Kasr AlAini Hosp., Egypt

HEGAZY M, HASSOUNA M, ABD ELFATTAH A, HASSAN O

Objectives: assess the incidence, and risk factors of hypothyroidism and hypoparathyroidism after total laryngectomy with removal of part of the thyroid gland.

Methods: Parathyroid and thyroid gland functions were evaluated in 40 patients who were diagnosed as T3, T4 cancer larynx who were treated with total laryngectomy with thyroidectomy with or without postoperative radiotherapy. It is a prospective analytic study. Serum T3, T4 TSH and total calcium levels were performed in those patients before and after total laryngectomy and were repeated one month later. The association of hypothyroidism and hypoparathyroidism were analyzed against several patient parameters including tumor and treatment characteristics.

Results: This study included 40 patients who were treated with total laryngectomy with thyroidectomy with or

without postoperative radiotherapy. There were 33 cases with thyroid gland free of any pathology. 2 Cases with colloidal nodules. 1 Cases with follicular adenoma. 4 Cases with invasion by laryngeal carcinoma. 25 patients (62.5%) had hypoparathyroidism proved by hypocalcemia 1 week postoperative. While 4 patients (10%) had hypothyroidism 1 week postoperative and 3 patients (7.5%) had only high TSH. After 1 month 6 patients (15%) continued to have hypoparathyroidism, and 8 patients (20%) had hypothyroidism. Among the 8 cases that had hypothyroidism after one month there were three cases subglottic carcinoma & three cases with transglottic carcinoma. Also three cases received preoperative radiotherapy. Six of them were stage T4. Three of them had total thyroidectomy, three had subtotal thyroidectomy, and two had hemithyroidectomy. None of them had invaded thyroid gland. Four cases 50% developed postoperative complications. Six cases need lifelong hormonal replacement.

Conclusions: Thyroid and parathyroid dysfunction are common complications after total laryngectomy specially if combined with radiotherapy. They should be anticipated and treated promptly.

» **HNOP-45 08:40~08:50**

» **Salvage surgery in recurrent laryngeal cancer analysis of prognostic factors and oncologic outcomes**

Department of Otolaryngology-Head and Neck Surgery, College of Medicine, The Catholic University of Korea

Sang-Yeon KIM, Kwang-Jae CHO, Young-Hoon JOO, Geun-Jeon KIM, Min-Sik KIM

Objectives: Both of conservation surgery and total laryngectomy can be applied for salvage surgery and many reports described the safety of salvage procedures. We designed this study to verify the safety of conservation salvage surgery and figure out the prognostic factors in

conservation surgery.

Methods:A retrospective review of the medical record of the patients who were diagnosed with squamous cell carcinoma(SCC) of larynx and underwent salvage surgery as primary treatment at our institution from 1991 to 2015 was done. This study was conducted using the data of patients who followed up at least 3 years

Results:53 patients were enrolled in this study (including 32 patients who underwent total laryngectomy and 21 patients with supracricoid partial laryngectomy; 2 patients with vertical hemilaryngectomy were excluded due to small number). 16 patients had salvage surgery after LASER cordectomy and 37 patients had salvage surgery after radiation. 5-year disease specific survival(DSS) rate and 5-year overall survival(OS) rate was 61.2%, 70.3% respectively. Post-operative positive margin status(positive group 37.1% and negative group 73.0% in 5-yr DSS rate; p-value=0.02*) and extranodal extension(ENE)(positive group 42.9% and negative group 68.3% in 5-yr DSS; p-value=0.04*) showed strong negative effect on survival rate. Patients who had salvage surgery after radiation failure tended to show more perineural invasion in post-operative pathology(58.3% vs 33.7%, p-value=0.04*) and it has significant negative correlation with 5-year DSS rate only in radiation failure group.

Conclusions:Both of supracricoid partial laryngectomy and total laryngectomy could be used as a useful options in recurrent laryngeal cancer patients. ENE and positive margin were revealed as a prognostic marker in salvage surgery of laryngeal cancer and especially in radiation failure cases, perineural invasion showed negative effect on oncologic outcomes.

HNOP IX

RM 2-3 (White Heron)

Chair : Sean Spencer EVANS, Hoonshik YANG

Oropharynx

» **HNOP-46 08:00~08:10**

» Is p16(+) predict the favorable prognosis of oropharyngeal cancer - Risk factors for treatment failure in patients managed with surgery based therapy

*Department of Otorhinolaryngology, Yonsei University
College of Medicine*

Young Min PARK, Min Seok KANG, Yoon Woo KOH, Eun Chang CHOI, Se-Heon KIM

Objectives:The purpose of this study was to determine clinical factors that predict treatment failure (recurrence or death) in patients with human papillomavirus (HPV)-positive oropharyngeal cancer treated with surgery with or without adjuvant therapy.

Methods:We identified all presumed HPV-positive patients with oropharyngeal cancer in our health system from November 2005 to November 2015 treated with surgery alone or surgery and adjuvant therapy. Statistical analysis was performed to identify clinical predictors associated with treatment failure.

Results:One hundred eighty-eight p16+ oropharyngeal cancers managed with initial surgical resection were identified. Median follow-up was 61months. Five-year local failure was 1%, regional failure was 5.3%, and distant failure was 3.2%. Death events was occurred in 3.2% patients. Statistical analysis found that conventional poor prognostic features did not predict treatment failure. ACJJ 8th staging system, number of metastatic lymph node, lymphovascular invasion, smoking history were significantly associated with disease recurrence or survival.

Conclusions:Conventional poor prognostic features did

not predict disease recurrence and death events in p16+ oropharyngeal cancer patients. AJCC 8th staging system was the most powerful prognostic factor for predicting disease recurrence and survival. Other factors including number of metastatic lymph node, lymphovascular invasion, smoking history were considered as a risk factor of disease recurrence.

» **HNOP-47 08:10~08:20**

» Tonsillectomy does not reduce upper respiratory infections a national cohort study

¹Department of Otorhinolaryngology-Head & Neck Surgery, Hallym University College of Medicine,

²Department of Otorhinolaryngology-Head & Neck Surgery, Seoul National University College of Medicine

Hyo Geun CHOI¹, Bumjung PARK¹, Soon-Hyun AHN²

Objectives:The objective of this study was to compare post-operative visits for upper respiratory infections (URIs) between tonsillectomy and non-tonsillectomy participants (controls).

Methods:Using the national cohort study from the Korean Health Insurance Review and Assessment Service, 1:4 matched (age, sex, income, region, and pre-operative URI visit) tonsillectomy participants (5,831) and control participants (23,324) were selected. Post-operative visits for URI were measured from 1 to 9 years post-op. The equivalence test was used. The margin of equivalence of the difference (Tonsillectomy- Control group) was set to -0.5 to 0.5.

Results:There was no difference between the tonsillectomy and control group in 1- to 9-year post-op visits ($-0.5 < 95\%$ CI of difference < 0.5). URI visits gradually decreased from 5.5/2 years (pre-op) to 2.1/year (at 1 year post-op) and 1.4/year (at 9 years post-op) in both tonsillectomy and control groups. In the subgroup analysis (children Vs adolescent and adults; rare Vs frequent pre-operative URI), there was no difference in the number of post-op visits for URI

between the tonsillectomy and control groups ($-0.5 < 95\%$ CI of difference < 0.5).

Conclusions:Tonsillectomy does not provide a decrease in the number of post-operative visits for URI, and URI decreased over time whether or not a tonsillectomy was performed.

» **HNOP-48 08:20~08:30**

» Comprehensive analysis of parapharyngeal space tumor removal according to the approaches: 10 year's experiences of Severance hospital

¹Department of Otorhinolaryngology, Gyeongang University College of Medicine, ²Department of

Otorhinolaryngology, Yonsei University College of Medicine, ³Department of Otorhinolaryngology, Seoul

National University of Medicine

**Joo Hyun KIM¹, Da Hee Kim², Won Shik KIM³,
Woo Yoon KOH², Eun Chang CHOI², Se-Heon KIM²**

Objectives:The parapharyngeal space tumor is rare, representing 0.5% of all head and neck masses and requires mostly careful surgical treatment. Various approaches to the parapharyngeal space have been reported and authors selected the best approach based on radiologic investigation, tumor size, histology, good exposure, preservation of critical neurovascular structures and operator's experiences. These have included transparotid, transoral, transcervical, various combinations of the above approaches and recently transoral robotic surgery (TORS). We analyzed 10 year's experiences of PPS tumor management to determine the best surgical approaches based on tumor characteristics.

Methods:Between January 2007 and July 2017, 68 patients with PPS tumors underwent surgery at our institute. Data was retrospectively collected and analyzed on patient characteristics, tumor characteristics, surgical approaches, perioperative outcomes and functional outcomes.

Results:There were 38 males and 30 females with a median age of 49 years and median follow up of 21.3 months.

Salivary gland tumors are most common tumors (33/68, 48.5%) histologically. The majority of 36 patients (52%) underwent surgery via transcervical approach or with transparotid approach. Transoral approach was performed in 13 patients with superomedial and well circumscribed PPS tumor. Since 2014, we have been starting to apply TORS in these cases instead of transoral approach. 19 patients had successful removal of PPS tumors. However 5 patients experienced complication. There was no recurrence during follow up period.

Conclusions: Transcervical approach with or without transparotid approach especially for patients with suspected malignancy, large size tumor, inferior PPS tumor and vascular origin tumor is required. However, in selected patients with superomedial, benign and well circumscribed, TORS is one of useful surgical option with definite advantage of minimal morbidity and avoiding external scars or tumor fragmentation due to high magnified visualization and wristed instruments.

» **HNOP-49 08:30~08:40**

» Revisiting age related admission following tonsillectomy in the pediatric population: Analysis of best practice

*Dep. Otolaryngology, Univ. Alabama at Birmingham
School of Medicine, Children's of Alabama Hosp.*

Sean EVANS, Brian KULBERSH

Objectives: To review and determine the safety and plausibility of same day discharge of children under three years old following adenotonsillectomy at a tertiary care academic center.

Methods: Retrospective review of 427 consecutive patients aged 24-42 months, undergoing adenotonsillectomy over a three-year period. Primary outcomes included: 0-30 day post-operative emergency room (ER) visit, re-admission, re-operation or greater than expected length of stay (LOS). Cohorts were stratified into younger (<36 months) and older groups for comparison (>36 months). Bivariate

comparisons were made using chi-square and Wilcoxon tests for categorical and continuous variables, respectively.

Results: No significant differences were seen among any age groups. 4.4% of patients were excluded from analysis for less than expected LOS. Greater than expected LOS was 4.5% for the older cohort and 4.7% for the younger (p=1.00). Return ER visit rates were 3.6% in the older children versus 3.0% in younger children (p=0.61). Readmission rates were 1.8% in older children vs. 1.0% in younger children (p=1.0).

Conclusions: Age stratification alone failed to demonstrate significance in determining post-operative admission requirements including need for inpatient intervention or risk of post-operative complication. It is therefore reasonable to consider outpatient adenotonsillectomy in patients aged 24-36 months with proper clinical discretion.

» **HNOP-50 08:40~08:50**

» Effect of preoperative hemoglobin level on the occurrence of secondary post-tonsillectomy bleeding

Dep. of Otorhinolaryngology, Kasr Alainy Hosp., Cairo Univ.

Osama A. METWALY, Hesham NEGM, Ahmed ATEF, Hesham LASHEEN

Objectives: Tonsillectomy is one of the commonest otolaryngological procedures performed. Multiple reports have demonstrated the safety of ambulatory (outpatient) pediatric Tonsillectomy, however Post-tonsillectomy hemorrhage remains the most serious complication of tonsillectomy.

Methods: In this work, we analyzed the relation between the pre-operative hemoglobin level and the occurrence of secondary post-tonsillectomy bleeding in two groups of patients indicated for tonsillectomy. One group of 160 patients didn't suffer from post-tonsillectomy bleeding as a control group the other of 40 patients having secondary post-tonsillectomy bleeding.

Results:According to our data, no significant difference between the two groups regarding the occurrence of secondary post-tonsillectomy in consideration with the preoperative hemoglobin level.

Conclusions:Although review of literature suggests that preoperative anaemia is independently associated with an increased risk of postoperative morbidity, there is no association between the pre-operative hemoglobin level in a particular patient candidate for tonsillectomy and the occurrence of post-tonsillectomy bleeding in that patient.

» **HNOP-51 08:50~09:00**

» **Oncologic and functional outcomes of TORS in tonsil cancer**

Department of Otolaryngology-Head and Neck Surgery, College of Medicine, The Catholic University of Korea

Sang-Yeon KIM, Geun-Jeon KIM, Young-Hoon JOO, Kwang-Jae CHO, Min-Sik KIM

Objectives:Recently de-intensifying and minimal invasive treatments are considered as an optimal choice for tonsil cancer. Many clinical trials are trying to reduce side effect of treatment. In surgical field, TORS are widely used with oncologic safety as an alternative method for conventional open surgery. So we designed this study to verify the oncologic safety and functional outcomes of TORS.

Methods:The clinical and pathologic data of 48 patients who underwent TORS for squamous cell carcinoma(SCC) of tonsil from 2009 to 2016 with minimum of 1 year of follow-up were reviewed. We evaluated for demographic, clinical history, survival rate, HPV association and functional result of those patients.

Results:Among 48 patients, 30 patients had clear margin after surgery and 18 patients showed close or positive margin. 5-year overall survival(OS) rate was 87.1% in HPV positive tonsil cancer patients and 78.6% in HPV negative patients. 5-year disease specific survival(DSS) rate was 78.3% in HPV positive patients and 70.6% in HPV

negative patients. In case of ENE(extranodal extension) was positive, 5-year DSS rate was decreased to 65.6% but there was no significant difference with ENE negative patients(81.3% in ENE(-) group, p-value=0.17). Mean decannulation time was postoperative 10.8 day, and nasogastric tube feeding was required for average 15.9 days after surgery. Those functional results in TORS patients showed statistically better outcomes than conventional surgery group(p-value=0.02*). There was no severe complication after TORS, but 3 patients experienced severe VPI(velopharyngeal insufficiency) and among them 2 patients required corrective pharyngoplasty to reduce nasopharyngeal reflux.

Conclusions:Although many limitations, we figure out TORS in tonsil cancer is a safe treatment option which also could achieve excellent functional outcomes by this study. Further study for TORS and tonsil cancer would suggest more precise treatment strategy concerning long term outcomes after treatment

HNOP X

RM 2-3 (White Heron)

Chair : Jin Choon LEE, Il-Seok PARK

Oral cavity

» **HNOP-52 09:00~09:10**

» **Comparison of diagnostic value of CT, MRI, and 18F-FDG PET CT to evaluate bony invasion of squamous cell carcinoma of the gingiva**

¹Department of Otolaryngology-Head and Neck Surgery, Kyung Hee University School of Medicine, Seoul, Korea, ²Department of Radiology, Kyung Hee University School of Medicine, Seoul, Korea, ³Department of Nuclear Medicine, Kyung Hee University School of Medicine, Seoul, Korea
Young Chan LEE¹, Ah Ra JUNG¹, Oh Eun

KWON¹, Eui-Jong KIM², Il Ki HONG³, Young-Gyu EUN¹

Objectives:The aim of this study is to compare the diagnostic value of three different imaging methods –CT, MR imaging, 18F-fluorodeoxyglucose (FDG) positron emission tomography (PET)/CT for detection of bony invasion by squamous cell carcinoma (SCC) of the gingiva.

Methods:Forty patients who underwent maxillectomy or mandibulectomy by SCC of the gingiva and performed CT, MR, PET/CT preoperatively from 2013 to 2017 were enrolled in this study. Each preoperative imaging was reviewed for the presence of bony invasion by one blinded head and neck radiologist or nuclear physician. The possibility of bony invasion on CT, MR and PET/CT was graded retrospectively on a 4-point score. These results were verified with pathologic finding and sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy were calculated.

Results:Pathologic examination revealed alveolus bony invasion in 15 of 40 SCCs. Among them, 6 patients involved in maxillary alveolus and 9 in mandibular alveolus. The sensitivity, specificity, PPV, NPV and accuracy for detection of gingiva bony invasion were 88.0%, 80.0%, 88.0%, 80.0% and 90.0% for CT; 88.0%, 73.3%, 84.6%, 78.5% and 82.5% for MR; and 80.0%, 66.6%, 80%, 66.6% and 75% for PET/CT, respectively. In case of maxillary alveolus invasion, the sensitivity, specificity, PPV, NPV and accuracy were 84.6%, 66.6%, 84.6%, 66.6% and 78.9% for CT; 84.6%, 50.0%, 78.5%, 60.0% and 73.6% for MR; and 76.9%, 83.3%, 90.9%, 62.5% and 78.9% for PET/CT, respectively. In case of mandibular alveolus invasion, the sensitivity, specificity, PPV, NPV and accuracy were 91.6%, 88.8%, 91.6%, 88.8% and 90.4% for CT; 91.6%, 88.8%, 91.6%, 88.8% and 90.4% for MR; and 83.3%, 55.5%, 71.4%, 71.4% and 71.4% for PET/CT, respectively

Conclusions:CT is more reliable for bony invasion assessment than MRI and PET/CT in gingiva SCC. In case involved in upper gingiva, preoperative detection of

bony invasion by SCC was less sensitive compared with mandibular alveolus.

» **HNOP-53 09:10~09:20**

» **Clinicopathologic analysis of squamous cell carcinoma of tongue cancer in young patients**

Department of Otolaryngology-Head and Neck Surgery, College of Medicine, The Catholic University of Korea

Sang-Yeon KIM, Kwang-Jae CHO, Young-Hoon JOO, Min-Sik KIM

Objectives:Increasing incidence of oral cavity cancer in young patients resembles the pattern of HPV-associated oropharyngeal cancer but the pathophysiology of 'early-onset' oral cavity cancer was not fully revealed. So we designed this study to figure out demographic and pathologic features of oral cavity cancer, especially tongue cancer in young patients by this study.

Methods:A retrospective review of the medical record of the patients who were diagnosed with squamous cell carcinoma(SCC) of tongue and underwent surgery at our institution from 2010 to 2016. Patients were divided into two groups, younger patients group(ages under 40) and older patients group(ages over 40). We reviewed HPV status, lymph node status, pathologic factors including margin status, tumor depth, differentiation and clinical history of patients.

Results:Medical record of 102 patients who diagnosed as tongue cancer were reviewed and among those patients, 20 patients were included in younger patients. In younger patients group, 6 patients(30%) showed perineural invasion, 5(25%) patients showed extranodal extension. In the aspect of oncologic outcomes, 5-year OS(overall survival) rate of younger patients group was 65.3% and 5-year DFS(disease free survival) was 60.8% respectively and there was no difference with older patients group(5-year OS=70.2%, 5-year DFS=63.3%). By multivariate analysis, perineural invasion and tumor differentiation

were revealed as a risk factors for the recurrence in younger patients group(p-value=0.04, 0.02, respectively).

Conclusions:Result of comparative analysis of prognosis and pathology of young patients showed similar result with older patients, but by multivariate analysis of risk factors, we figure out that perineural invasion and tumor differentiation have significant impact on recurrence of disease inyounger patients group. Despite of small number patients, this study can be used as a clue for the treatment of young tongue cancer patients.

» **HNOP-54 09:20~09:30**

» Correlation of treatment outcome in oral cavity SCC within different age groups

*Departments of Otolaryngology Asan Medical Center,
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Republic of Korea*

**Turki ALMUHAIMID, Ja Yoon KU, Jong-Lyel
ROH, Seung-Ho CHOI, Sang Yoon KIM, Soon
Yuhl NAM**

Objectives:The majority of OCSCC affecting older patients among young individuals, the occurrence of OSCC is uncommon, but an increase in the incidence of the malignancy in this population has been observed in different cohorts, accounting for 3.1% to 18.8% of all cases. There is variety of prognosis and recurrence in both age groups in different studies. The hypothesis of our study the young patients has more aggressive and high recurrence than elderly.

Methods:A retrospective study for oral cavity SCC carcinoma done in a single institute ASAN medical center (comparative between two groups patients who had OCSCC below 40 year and those above) with study period 2010-2017 (7 year). We enrolled 336 patients who continue follow-up in same hospital.

Results:Patients age range from (21-87) with median age 56 year. There were 51 patients who have OCSCC below age of 40 (15.2%) and 285 (84.8 %) patients above

40 year. Most common in male 210 patients 62.5% (in patients below 40 is 31 (14.8%)). Tongue is commonest site in both group 254(75.6%) 46 vs. 208. Palatine cancer is second common site in younger patients while Floor of Mouth in elderly patients. The recurrence shown in 73 patients without significant difference in both group (9 (12.3%) vs. 64 (87.7%)). Mortality seen in older patients more than young patients (5 (7.8%) vs. 59 (92.2%)) with significant (P value 0.045).

Conclusions:Our study showed no significant difference in recurrence among young and elderly patient however mortality is high in elderly.

» **HNOP-55 09:30~09:40**

» Analysis of functional outcomes in tongue cancer when do we need flap reconstruction

*Department of Otolaryngology-Head and Neck
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of Korea*

**Ji-Hyung LIM, Sang-Yeon KIM, Geun-Jeon KIM,
Kwang-Jae CHO, Young-Hoon JOO, Min-Sik
KIM**

Objectives:The purpose of this study was to figure out the optimal resected volume for the simultaneous primary reconstruction to restore postoperative swallowing function based on the extent of resection volume and reconstruction methods in tongue cancer.

Methods:A retrospective review of the medical record of the patients who were diagnosed as squamous cell carcinoma(SCC) of tongue and underwent surgery at our institution from 2006 to 2015. In those patients we enrolled patients who had swallowing examination, appropriate follow up periods(>1 year). We reviewed volume of resected specimen and tumor, methods of reconstruction, volume of flap, swallowing score(SCAS scale), aspiration score in modified barium swallowing(MBS).

Results:Finally 149 patients who underwent primary surgery for oral cavity cancer were enrolled in this study.

87 patients had tumor resection with primary closure and 62 patients had resection following by simultaneous flap reconstruction. Among 87 patients who did not have any reconstruction, 11 patients showed swallowing difficulty and needed MBS study during follow up period. Mean resected volume was 16.92cm³, 27.34cm³, 43.21cm³ in primary closure group with favorable diet and unfavorable diet group, flap reconstructed group respectively. We used ROC curve to investigate cutoff value of resected volume for the favorable diet in primary closure group. 21.40cm³ was revealed as cutoff value for appropriate resected volume without swallowing difficulty in primary closure group with 74.3% sensitivity.

Conclusions: We tried to find out optimal resection volume for the resection without reconstruction in oral cavity cancer. Considering post-operative functional defect, more concerns should be taken for the proper reconstruction in those patients

» **HNOP-56 09:40~09:50**

» Analysis of difference in gene profiles between early and late lymph node metastasis in tongue cancer

Department of Otorhinolaryngology Head and Neck Surgery, Seoul Nation University College of Medicine

Doh Young LEE, Woo-Jin JEONG, Young Ho JUNG, Tack-Kyun KWON, Soon-Hyun AHN, Seong Keun KWON

Objectives: Appropriate patient selection for elective neck dissection in N0 tongue cancer has been controversial, while there has been no genetic consideration so far. We aimed to analyze genetic difference between early and late cervical lymph node metastasis in oral tongue cancer patients using the Seoul National University Hospital (SNUH) cancer cohort and cancer genome atlas (TCGA) data, and to suggest genetic background for choosing eligible patient for elective neck dissection.

Methods: A total of 63 cases with matched RNAseq data

of primary tumor and clinical TCGA data were enrolled in this study. Additionally, 35 cases with RNAseq in SNUH cancer cohort with tongue cancer were also enrolled in this study. To investigate gene expression in early cervical lymph node metastasis, genomic data of following 2 groups was compared; 1) group 1: T1/2 and N+, 2) group2: T1/2 and N+. Differentially expressed genes (DEGs) were extracted using R and limma package in bioconductor program. Gene ontology and pathway enrichment analysis were performed using DAVID online tool.

Results: A total of 40 DEGs were observed. Eleven genes were downregulated and twenty nine genes were upregulated. Significant genes were PLA2G4D, NELL2, PCOLCE2, PI3, and PLA2G3. were On KEGG pathway analysis, calcium, muscle contraction, and arachidonic acid metabolism-related pathway was significantly correlated.

Conclusions: Early stage oral tongue cancer with neck metastasis may exhibit distinct genetic characteristics compared to those without neck metastasis.

» **HNOP-57 09:50~10:00**

» Incidence of metastasis at level ii b in oral cavity cell carcinoma

Dep. of Otorhinolaryngology, Fatima Hosp., Baqai Med Univ

Syed Salman HASHMI

Objectives: To determine whether level II b lymph nodes can be saved in selective neck dissection, as a treatment for patients with oral squamous cell carcinoma

Methods: This was a prospective study conducted in the Department of ENT Head and neck surgery Patel Hospital Karachi. A sample size of minimum 65 patients was calculated using open WHO sample size calculator, with p = 4, margin of error (d) = 4% and 90% confidence interval. Sampling technique was non probable consecutive sampling. Level IIa and IIb were separately dissected out in all patients and marked before sending for histopathology. The study period was started from August 2014 to August

Withdrawal

2016. All patients undergoing neck dissection for oral cavity and lip SCC during this period are included in the study. Patients with prior oncological treatment or surgery for recurrent or residual tumor were excluded. Main outcome measure was the incidence of histopathological proven metastasis lymph nodes at level IIb.

Results: A total of 65 patients with biopsy proven squamous cell carcinoma of any subsite of the oral cavity were included in the study. Mean age of the patients were 46.38 (SD 10.37) with 80 % male population. Out of them 34 (52.3%) were clinically node negative. All patients underwent selective neck dissection. Average no of lymph nodes recovered were 40.63 (SD 19.55). Incidence of metastasis at level II b was 9.2 % (6 patients, out of 3 were clinically node negative and 3 were clinically positive). Most (4) of the patients with positive nodes at level IIb had also positive nodes at level IIa.

Conclusions: Our result shows relatively higher incidence of metastasis at level IIb as compared to international literature. Therefore we suggest level II b can be dissected out in selective neck dissection for oral cancers, especially in patients with clinical node positive status. Further comparative studies with large data, post operative follow up are required to draw the final inference.

» **HNOP-58 10:00~10:10**

» The thickness of extranodal extension as a predictor of post-treatment recurrence and survival in metastatic oral cavity cancer

*Department Otorhinolaryngology-Head & Neck
Surgery, Asan Medical Center, University of Ulsan*

College of Medicine, Seoul, Korea

**Ho Jun LEE, Jae Ryung LEE, Yoon Se LEE,
Seung-Ho CHOI, Soon Yuhl NAM, Sang Yoon
KIM, Jong-Lyel ROH**

Objectives: Lymph node metastasis of oral cavity squamous cell carcinoma (OSCC) significantly affects tumor progression and patient survival. Extranodal extension

(ENE) of a metastatic lymph node is considered as a major prognostic factor. However, the association between the extent of ENE and prognosis is not clearly defined. Therefore, we evaluated the prognostic values of ENE and its extent in predicting post-treatment recurrence and survival in patients with OSCC.

Methods: This retrospective study involved the 265 patients who underwent primary tumor extirpation and neck lymph node dissection for previously untreated OSCC between 2006 and 2015. Histological findings of tumor and nodes were examined and reported. The extent of ENE was defined the presence and thickness of extracapsular spread of metastatic lymph nodes. Cox proportional hazard regression analyses were used to find factors predictive of recurrence-free survival (RFS) and overall survival (OS).

Results: Lymph node metastasis and ENE were found in 86 (32.5%) and 25 (29.0%), respectively. In all study patients, of nodal factors, lymph node metastasis, lymph node ratio (>0.05), and ENE thickness (≥ 2 mm) were significantly associated with both RFS and OS (all $P < 0.05$). In patients with lymph node metastasis, lymph node ratio and ENE thickness were significantly associated with both RFS and OS (all $P < 0.05$). After controlling clinical and other pathological factors, the LNR and ENE thickness were the independent factors of RFS and OS in both all and node-positive patients ($P < 0.05$). The ENE thickness ≥ 2 mm was associated with the five-fold increased risk of post-treatment recurrence.

Conclusions: The ENE thickness is an important predictor of post-treatment recurrence and survival in metastatic OSCC.

» **HNOP-59 10:10~10:20**

» Posterior tibial artery perforator flaps in head and neck reconstructions

King Fahad Specialist Hospital Dammam Saudi Arabia
Mansour Al ASSIRY, Turki ALMUHAJID

Objectives: Oral cavity and oropharyngeal area are common

sites for head and neck cancer associated with functional and cosmetic defect. surgical treatment for cancer of the oral cavity can result in dramatic aesthetic and functional sequel partially avoidable by reconstructive techniques. the aim of our case series is to determine the outcome of reconstruction of oral cavity and oropharyngeal using posterior tibial artery perforator flaps (ptapf)

Methods:A retrospective case series from feb 2014 july 2015 we did 4 cases of oral cavity cancer and one case of oropharyngeal cancer tumor resected and reconstructed by (ptapf) done in single institute king fahd specialist hospital in department of otolaryngology head and neck surgery.

Results:Three cases of tongue cancer reconstructed by ptapf one change intraoperatively to radial forearm.one case of hard palate cancer reconstructed by ptapf and one case of oropharyngeal mucoepidermoid mucoepidermoid cancer reconstructed by ptapf. patients follow up in clinic with no recurrence or flap complication functional and cosmetic.

Conclusions:Posterior tibial artery perforator flaps is an alternative choice in reconstruction of oral cavity and oropharyngeal cancer with advantage of thin, easily harvested, little anatomical variation and concealed donor site. also it can be used in case of contraindication for radial forearm free flap. limitations of ptapf are peripheral arterial disease and venous disease.

HNOP XI

RM 2-3 (White Heron)

Chair : Young Mo KIM, Abhishek MAHAJAN

Tracheoesophagus

» **HNOP-60 10:40~10:50**

» Laryngotracheal stenosis; An overview of the various management procedures according to Cairo University experiences

*Otorhinolaryngology Dep., Kasr Alainy Teaching
Hosp., Faculty of medicine, Cairo Univ.*

Ahmed Mahmoud EL BATAWI, MD

Objectives:With the increased use of mechanical ventilation and endotracheal intubation in intensive care units and as a result of the prolonged intubation, there is an increasing rate of acquired laryngotracheal stenosis in patients following intubation (10- 21%). Besides there is an endemic state of laryngoscleroma in some parts of Egypt, laryngotracheal trauma and to lesser extent affection by tumours. All these are important factors leading to laryngotracheal stenosis.

Methods:This is a retrospective study aiming for presenting the results in management of 39 cases laryngotracheal stenosis (the majority were acquired after prolonged intubation and the others were due to scleroma, tracheal trauma or tumours). Their management varied between single or combined procedures of endoscopic dilatation, open laryngotracheo-plasty and/or tracheal resection and anastomosis with or without post operative stenting.

Results:Most of the purely tracheal stenotic patients were successfully managed by resection and anastomosis (22/26), two patients (2/26) were managed by endoscopic dilatation only, and two patients (2/26) failed to be decannulated and needed montgomery stenting. Nearly all the combined stenotic patients (i.e Tracheal stenosis with cricoid involvement +/- vocal cords adhesion) were failed to be permanently decannulated (10/13) except three patients

with minimal affection of the anterior part of the cricoid cartilage.

Conclusions: Management of laryngotracheal stenosis and the use of the proper procedure needs high selection of the patients regarding the length of stenotic segment, the involvement of the cricoid cartilage, the patient age and the comorbidities of each case.

» **HNOP-61 10:50~11:00**

» Development of the optimal decellularization protocol for respiratory mucosa and evaluation of its feasibility for treating partial mucosal defect

¹Department of Otorhinolaryngology-Head and Neck Surgery, College of Medicine, Ewha Womans University, Seoul 07985, Korea, ²Department of Molecular Medicine, College of Medicine, Ewha Womans University, ³Department of Molecular Science and Technology, Ajou University
Soo Yeon JUNG¹, Ha Yeong KIM^{1, 2}, An Nguyen-Thuy TRAN³, Hyun Ju OH¹, Min Ji LEE^{1, 2}, Sojeong KIM¹, Han Su KIM¹

Objectives: The partial mucosal defect is common in the otorhinolaryngology clinic. The conventional treatment options are observation or autologous skin graft. However these treatment modality require a long time for the wound to completely be healed and cause pain and discomfort to the patient. Lately, acellular dermal matrix (ADM) was developed and clinically used to cover the mucosal defect. However, since ADM was derived from the dermis, it is too thick and tough to be applied in oral cavity and pharynx. To overcome these limitations, authors develop the acellular mucosal matrix by using decellularization protocol for respiratory mucosa. The aim of this study was to develop the decellularization protocol for sheet-type respiratory mucosa and evaluate its feasibility.

Methods: Porcine tracheas were obtained at a local abattoir from market sized pig. The 15 cm-sized trachea was frozen at -80°C. After Thawing, the respiratory mucosa was separated

from the tracheal cartilage. The two detergent (A: Trypsin + Triton X-100 + Deoxycholic acid, B: Trypsin+Triton X-100 + Perasafe)-based decellularization protocols were applied with agitation. DNA quantification, histological evaluation, mechanical test, and collagen assay were performed.

Results: The protocol B (protocol with perasafe) took 120 hours to reach the adequately decellularized level. However, protocol A was shown to be unsuitable methods which was poorly decellularized. The decellularized respiratory mucosa by protocol A showed proper mechanical property to be used in oral cavity reconstruction. It was elongated to 150% of its original length and restored to original shape.

Conclusions: The results indicated that these decellularized respiratory mucosa had good biomechanical properties and could be the potential candidate for biological sheet to repair mucosal defect.

» **HNOP-62 11:00~11:10**

» Safety of a commercially available fiberoptic laser in a rabbit vocal fold model

Department of Otolaryngology - Head and Neck Surgery, Soonchunhyang University College of Medicine, Bucheon, Korea
Seung Won LEE, Ki Nam PARK, Jae Hong PARK, Myung Jin BAN

Objectives: This study was performed to assess and compare the degree of vocal fold injury according to the type of fiberoptic laser in a rabbit model

Methods: Fiberoptic CO₂, potassium titanyl phosphate (KTP), and holmium lasers were used to deliver 20 J of the same frequency and power to the vocal fold mucosa in a total of 108 male New Zealand white rabbits. Scanning electron microscopy (SEM) and histological analysis were performed at 1 day post-injury in the acute injury group. Histological analysis and high-speed digital camera examination of vocal fold vibration were performed at 1 month post-injury in the chronic injury group

Results: In the acute injury group, the holmium laser

showed a significantly greater acute injury ratio (injured vocal fold pixels/total vocal fold pixels) than the KTP and CO2 lasers. In the chronic injury group, the holmium laser showed more severe vocal fold scarring (lamina propria ratio = lamina propria pixels/total vocal fold pixels) than the KTP and CO2 lasers. Functional evaluation for vocal fold vibration using a high-speed digital camera indicated a reduced dynamic glottal gap compared with the normal vocal fold with the holmium laser, while no significant reduction in dynamic glottal gap was observed with KTP and CO2 lasers

Conclusions:The histological and functional results of rabbit vocal fold experiments indicated that fiberoptic laryngeal laser surgery for benign vocal fold lesions could be performed relatively safely using a KTP or CO2 laser

» **HNOP-63 11:10~11:20**

» **CT based modified SHIN classification for grading trachea invasion addressing the resectability issues in thyroid cancer**

¹Department of Radiodiagnosis, ²Department of Head and neck surgical oncology, ³Department of Pathology Tata Memorial Hospital, Mumbai, India
Dr. Abhishek MAHAJAN¹, Dr. Richa VAISH², Dr. Nilesh SABLE¹, Dr. Devendra CHAUKAR², Prof. Shubhada KANE³, Prof. Anil D'CRUZ¹

Objectives:Evaluate the diagnostic value CT based modified SHIN Classification for preoperative prediction of TI in patients with papillary thyroid cancer (PTC).

Methods:Retrospective study PTC patients who underwent total thyroidectomy (with or without neck dissection 39 surgical nodules 29 unilateral, 5 bilateral). Preoperative CT were performed in all. TI was categorised based on contact of tumor with trachea on CT imaging modalities. Grades of CT based SHIN Classification I disease abuts but does not invade external perichondrium. II disease invades into the cartilage or causes cartilage destruction. III disease extends into the tracheal mucosa with no elevation

or penetration of the mucosa. IV disease is full-thickness invasion with expansion of the tracheal mucosa with a bulge along tracheal lumen. Other imaging features that were analysed were Angle of contact (in degree) grade I 0-89 II 90-179 III 180-269 IV- 270 or more ShapeScore I horseshoe, elliptical, or circular configuration II trachea with a locally straightened wall III trachea with an inward concave deformity. Grade of enhancement None, similar, hyperenhancement Other parameters investigated were patient's age, sex, surgical procedure performed, and pathology. Considering histopathology as the gold standard diagnostic performance of CT imaging for predicting TI was calculated and logistic regression model was also generated.

Results:CT based SHIN categories I- 15(39%), II- 10(25%), III- 8(21%) and IV- 6(15%). CT based scoring had very high specificity (98%) and NPV (93%) for predicting TI. The sensitivity was 87% and PPV was 89%. More than 130-degree contact with trachea, soft tissue within the cartilage and score III shape were strong predictor of TI (P value < 0.05). Grade of enhancement showed no correlation.

Conclusions:CT based Modified SHIN classification has a very high negative predictive value for predicting TI and can help optimizing postoperative outcomes with efficient preoperative assessment.

» **HNOP-64 11:20~11:30**

» **Effect of thyroidectomy on laryngotracheal movement-Ultrasound study preliminary report**

Department of Otorhinolaryngology-Head and Neck Surgery, Korea University College of Medicine
Jae-Gu CHO, Young Min PARK, Kyung Ho OH, Seung-Kuk BAEK, Soon-Young KWON, Kwang-Yoon JUNG, Jeong-Soo WOO

Objectives:Swallowing difficulty is a possible symptom after thyroidectomy. This complaint is usually related to superior and inferior laryngeal nerves dysfunction, but these can

appear even after uncomplicated surgical procedure. The aim of this study is to evaluate the relation between swallowing difficulty and limitation of laryngotracheal movement after thyroidectomy.

Methods: 28 patients who underwent thyroidectomy were evaluated Thyroidectomy related symptom questionnaire at pre-operation, post-operation 1, 3 month. At the same time, ultrasound evaluation was done, and the distance of laryngotracheal elevation was measured.

Results: Thyroidectomy related symptom was deteriorated until 1 month after thyroidectomy and improved from 3 months after surgery. The distance of laryngotracheal movement also decreased until 1 month, but it is recovered after 3 month of surgery. In the ultrasound examination, the laryngotracheal unit with strap muscle was attached to subcutaneous tissue after surgery.

Conclusions: In the ultrasound study, the laryngotracheal movement was limited after thyroidectomy, and the distance of laryngotracheal movement was related to the thyroidectomy related symptom score. Attachment of laryngotracheal unit to subcutaneous tissue may be the one of the causes of swallowing difficulty after thyroidectomy

» **HNOP-65 11:30~11:40**

» **Oncologic outcomes after pulmonary metastasectomy with video assisted thoracic surgery (VATS) of head and neck cancers**

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**Hanaro PARK¹, Sung jun HAN², Woo-Jin
JEONG², Young Ho JUNG², Myung Whun
SUNG¹, Soon-Hyun AHN¹**

Objectives: Pulmonary metastatic head and neck cancers has traditionally had a bad prognosis. And, although pulmonary

metastasectomy has been performed in selected patients, there are only few reports of the outcomes and benefits. In this study, we examined the clinical characteristics and oncological follow-up findings of patients who underwent pulmonary metastasectomy with VATS with the aim of assess the efficacy and outcome.

Methods: A retrospective review was performed of 32 patients with pulmonary metastasis of primary head and neck cancer who underwent metastasectomy with VATS between 2003 and 2017 at two tertiary referral centers.

Results: Twenty-five patients were male and seven was female. The mean age of the patients was 59.5 (25~83) years. The median disease-free interval from the time of treatment of their primary cancer was 25.5 (± 29.43) months. Twenty-seven cases underwent partial resection, 3 underwent segmentectomy, and 2 underwent lobectomy. Resection margin status was negative in all cases. The 1-year and 5-year disease free survival rates (DFS) were 63.1% and 29.5%, and 1-year DFS of Squamous cell carcinoma were 54.7%. The 1-year and 5-year DFS of Adenoid cystic carcinoma were 85.7% and 0%, respectively, as determined by the Kaplan-Meier method. Univariate analysis showed that the prognosis was poor in high T stage (T3 and 4) cancer, primary stage IV cancer, and cervical lymph node metastasis in Adenoid cystic carcinoma.

Conclusions: Pulmonary metastasectomy with VATS would give a chance for long-term disease free survival in patients with advanced head and neck cancers, but careful patient selection is needed, in order to produce good therapeutic outcomes.

HNOP XII

RM 2-3 (White Heron)

Chair : Seung-Kuk BAEK, Guk Haeng LEE

Thyroid II

» **HNOP-66** 11:40~11:50

» Comparison of postoperative cosmesis between transaxillary, postauricular facelift and conventional thyroidectomy

¹Department of Otolaryngology-Head and Neck Surgery, College of Medicine, Hanyang University, Seoul, Korea, ²Department of Otorhinolaryngology-Head and Neck Surgery, School of Medicine, Catholic University of Daegu, Daegu, Korea

Dong-Won LEE^{1,2}, Seok-Hwa KO¹, Youn-Il JANG¹, Dong-Hwan KIM¹, Chang-Myeon SONG¹, Kyung TAE¹

Objectives: Remote-access robotic or endoscopic thyroidectomy, such as the transaxillary and postauricular facelift approaches, have been developed with the aim of concealing the scar in the neck. The purpose of this study was to compare the cosmetic outcomes of robotic thyroidectomy via gasless transaxillary and postauricular facelift approaches with those of conventional thyroidectomy.

Methods: We reviewed 169 patients who underwent robotic thyroidectomy using a gasless unilateral axillary (GUA) approach (55 patients) and postauricular facelift approach (56 patients), and conventional trans-cervical approach (58 patients). Subjective cosmetic outcome was evaluated using a questionnaire developed by us and the Vancouver scar scale up to 1 year after surgery. The cosmetic satisfaction score was defined as the sum of the two cosmetic satisfaction questions with a rating scale of 0-4. The scar consciousness score was defined as the sum of the four scar consciousness questions with a rating scale of 0-3.

Results: The cosmetic satisfaction and scar consciousness

were significantly better in the transaxillary and postauricular facelift groups than the conventional group ($p < 0.001$). The cosmetic satisfaction and scar consciousness scores were not statistically different between the transaxillary and postauricular facelift groups. The Vancouver scar scale score of the conventional group (1.51 ± 0.78) was significantly lower than those of the transaxillary (2.48 ± 1.2) or postauricular facelift groups (2.43 ± 1.19), ($p < 0.001$ in both).

Conclusions: Robotic thyroidectomy via transaxillary or postauricular facelift approaches results in superior cosmesis than conventional procedure. However, scar healing itself was worse in transaxillary and facelift approaches than conventional procedure.

» **HNOP-67** 11:50~12:00

» Risk for metastasis of suprasternal space in papillary thyroid cancer

Department of Otorhinolaryngology-Head and Neck Surgery, Pusan National University School of Medicine, Pusan National University Hospital
Hyun-Keun KWON, Dawoon JUNG, Sung-Chan SHIN, Seon-Lin KIM, Jaehwan JEONG, Yu-Mi LEE, Byung-Joo LEE

Objectives: There have been few reports on the suprasternal space in clinically node positive(cN+) papillary thyroid carcinoma(PTC). Therefore, the aim of this study was to investigate the incidence and risk factors of the suprasternal space metastasis.

Methods: A total 73 patients with cN+ PTC underwent total thyroidectomy with elective neck dissection including the suprasternal space between January 1, 2012 and January 31, 2018 at Pusan National University Hospital. We analyzed for the correlation between suprasternal space metastasis and sex, age, tumor size, lateral cervical lymph nodes, and central cervical compartment metastasis status.

Results: In 73 patients, 56 patients (76.7%) showed the suprasternal space nodes in their surgical specimen, and 11

patients (15.1%) had pathologically positive suprasternal metastasis. Suprasternal metastasis was correlated with multifocality and the number of positive metastatic node at the ipsilateral level III and level IV lymph node($p<0.05$).

Conclusions:The suprasternal space dissection is less invasive, easy to achieve, and in not time consuming. In cN+ PTC, especially with multifocality and level III and/or level IV metastasis, greater attention should be paid to the suprasternal space as an area with the potential for lymph node metastasis. We recommend the suprasternal space should be routinely dissected in cN+ PTC.

» **HNOP-68 12:00~12:10**

» Voice outcomes of perioperative voice analysis, patient education, and routine voice therapy after thyroid surgery

*ThanQ Seoul Thyroid-Head & Neck Surgery Clinic,
Seoul, Korea*

Jeong Hun HAH

Objectives:Most of the patients before thyroidectomy have worries about possible voice change after surgery. Postoperative voice change is known as relatively common, and it can occur even without nerve injury. Clinical guidelines on thyroid surgery recommend perioperative voice evaluation, patient education, and early intervention in the voice problem. However, most of thyroid surgery centers do not have the programs caring for patients' voice. This study was to show the voice outcomes of perioperative voice analysis, education, and routine voice therapy after thyroidectomy.

Methods:Forty-nine patients, who completed preoperative and postoperative voice analysis, among 123 patients received thyroid surgery at ThanQ Thyroid-Head & Neck Surgery Clinic from Oct. 2016 through Dec. 2017 were enrolled. Voice therapy was scheduled 5 times on postoperative day 1 and on every hospital visit irrespective of patients' voice complaints. Postoperative voice outcomes 1 month after surgery were compared with preoperative

ones using acoustic analysis and thyroidectomy-related voice questionnaire (TVQ).

Results:Unexpectedly, 28 patients (57%) expressed postoperative improvement in their voice and voice related symptoms on subjective TVQ, while 9 (18%) no change and 12 (25%) worsening. On acoustic analysis, there was no significant change in jitter and shimmer. Noise-to-harmonics ratio was decreased in female. Fundamental frequency (F0) was lowered significantly in female, while speaking F0 had not changed significantly in them. Speaking F0 in male was elevated significantly after surgery ($P=.0073$). These objective changes were not correlated with subjective symptoms.

Conclusions:Perioperative voice evaluation, patient education, and early intervention in the voice problem might improve patients' satisfaction and voice quality after thyroid surgery. Further study is warranted for schedule and contents of voice therapy after thyroidectomy.

» **HNOP-69 12:10~12:20**

» Can preoperative thyroidectomy-related voice questionnaire scores predict voice changes after thyroid surgery

*Department of Otorhinolaryngology-Head and
Neck Surgery, Pusan National University School of
Medicine, Pusan National University Hospital*

**Jae-Wook KIM, Sung-Chan SHIN, Won-Jae
CHA, Yeon-Woo LEE, Hyun-Keun KWON,
Byung-Joo LEE**

Objectives:The Thyroidectomy-related Voice Questionnaire (TVQ) is an efficient screening tool for detecting postoperative vocal dysfunction. The aim of this study was to determine whether a preoperative TVQ can be used to predict voice changes after thyroid surgery.

Methods:We examined 186 women who underwent total thyroidectomy from March 2014 to May 2016. All patients followed the same preoperative (2 weeks before surgery) and postoperative (2 weeks, 2 and 8 months after surgery)

voice evaluation schedule. According to the preoperative TVQ score, participants were classified into “normal” (TVQ score <5) and “abnormal” (TVQ score ≥5) categories.

Results:In the normal TVQ score group, speaking fundamental frequency (SFF) was significantly decreased at 2 months postoperatively, but returned to preoperative levels after 8 months. The TVQ score remained significantly elevated for 8 months postoperatively. The preoperative and postoperative (8 months) TVQ scores were 1.60 ± 1.34 and 14.45 ± 10.41 , respectively (mean ± standard deviation). The TVQ score increased by 12.85. points ($p < 0.001$). In the abnormal TVQ score group, the fundamental frequency (F0) and SFF were significantly decreased for 8 months postoperatively. F0 decreased 6.7 points ($p = 0.0021$) and SFF decreased 3.3 points ($p = 0.0429$). The TVQ score was significantly increased at 2 months postoperatively, but returned to preoperative levels within 8 months following total thyroidectomy. The preoperative and postoperative (8 months) TVQ scores were 18.47 ± 11.34 and 19.42 ± 15.04 , respectively ($p = 0.4180$).

Conclusions:Many patients experience long-term voice problems with no evidence of laryngeal nerve injury. The non-neurogenic mechanisms of post-thyroidectomy voice alteration are often unrecognized. The preoperatively normal TVQ score group may express complaints regarding voice deterioration without objective reasons after surgery, and the degree of complaint may be more severe than in the abnormal group.

» **HNOP-70 12:20~12:30**

» **Changes in voice- and swallowing-related symptoms after thyroidectomy**

Department of Otorhinolaryngology-Head and Neck Surgery, Korea University College of Medicine
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Objectives:Many patients complain of voice changes or

discomfort during swallowing following thyroidectomy procedures. In this study, we evaluated the voice and swallowing status of patients undergoing thyroid surgery using the thyroidectomy-related voice questionnaire, and evaluated the changes in postoperative symptoms for 1 year. **Methods:**113 patients who had been diagnosed with a thyroid tumor and undergone thyroidectomy were included in this study. The thyroidectomy-related voice questionnaire was used to evaluate voice- and swallowing related conditions associated with thyroid surgery before the operation and 1, 3, 6, and 12 months postoperatively. After dividing the patient group according to the extent of surgery, neck dissection, age, sex, disease entity, tumor size, and macro-extrathyroidal extension, we compared the temporal changes in voice-and swallow-related scores between patient groups and clinicopathological factors related to PTS.

Results:The mean thyroidectomy voice-related questionnaire (TVQ) score before surgery was 12.41 ± 12.19 ; it significantly increased to 28.24 ± 18.01 ($P < .001$) 1 month postoperatively, decreased to 24.02 ± 17.30 ($P = .014$) and 20.66 ± 15.29 ($P = .023$) 3 and 6 months postoperatively, respectively. It was continuously decreased to 18.83 ± 14.63 twelve months postoperatively. The temporal changes in TVQ scores between patients who underwent total thyroidectomy or lobectomy were significantly different.

Conclusions:Voice- and swallowing-related discomfort in patients who received thyroidectomy showed dynamic changes over time. There was a significant difference in the degree of change according to clinicopathological factors. Patients with these risk factors may benefit from appropriate patient education and various rehabilitation programs for symptom relief.

» **HNOP-71 12:30~12:40**

» **Prediction of hypothyroidism after thyroid lobectomy for papillary thyroid carcinoma**

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Medicine, Seoul, Republic of Korea

**Mi Rye BAE, Jong-Lyel ROH, Gyungyup GONG,
Kyung-Ja CHO, Seung-Ho CHOI, Soon Yuhl
NAM, Sang Yoon KIM**

Objectives:Thyroid lobectomy becomes increasingly recommended for primary treatment of papillary thyroid carcinoma (PTC). However, hypothyroidism may develop after lobectomy, requiring thyroid hormone supplementation. Therefore, we examined the factors predictive of hypothyroidism after thyroid lobectomy for PTC.

Methods:This retrospective study involved a total of 190 patients who underwent thyroid lobectomy for PTC between 2006 and 2015. Thyroid function and other laboratory tests were obtained before and regularly after lobectomy. Post-lobectomy hypothyroidism was defined as thyroid stimulating hormone (TSH) level >5mIU/L. Binary logistic regression analyses were used to find factors predictive of postoperative hypothyroidism.

Results:Hypothyroidism developed in 135 patients (71.1%) including 6 with overt hypothyroidism and 129 with subclinical hypothyroidism. Univariate analyses showed that preoperative TSH level (odds ratio(OR)=2.88, $p<0.05$), MACIS score (OR=0.64, $p<0.05$) and sex (OR=2.71, $p<0.05$) were associated with the post-lobectomy development of subclinical and overt hypothyroidism. Multivariate analyses showed that preoperative TSH level remained the independent variable of post-lobectomy hypothyroidism.

Conclusions:Preoperative TSH levels might be a factor predictive of developing hypothyroidism after lobectomy for PTC.

HNOP XIII

RM 2-3 (White Heron)

Chair : Khairullah Bin ANUAR, Soon Yul NAM

Other Head and Neck

» **HNOP-72 13:30~13:40**

» Tensin-3 regulate the biology of human tonsil-derived mesenchymal stem cells through *B* 1-integrin¹

¹*Department of Otolaryngology Head and Neck*

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Gi-Cheol PARK¹, Hee-Young PARK², Ji-Min KIM², Sung-Chan SHIN², Byung-Joo LEE²

Objectives:Human palatine tonsils have emerged as a new potential tissue source of multipotent mesenchymal stem cells (MSCs). The proliferation rate of palatine tonsil-derived MSCs (T-MSCs) was far higher than that of bone marrow-derived MSCs (BM-MSCs) or adipose tissue-derived MSCs (A-MSCs). We already knew that tensin-3 (TNS3), a type of focal adhesion protein, was found to be highly expressed in T-MSCs compared with those in both BM-MSCs and A-MSCs by DNA microarray in our previous study. In present study, we tried to find out about the role of TNS3 role in the biology of T- MSCS and its relationship with integrin.

Methods:The palatine tonsils were obtained from four different patients. Quantitative reverse transcription PCR (qRT-PCR) was used to validate the previous microarray results. In order to quantify the proliferative potential, we conducted cell count assay.

Results:Real-time PCR analyses confirmed that the expression of TNS3 was significantly elevated in T-MSCs

compared with those in A-MSCs and BM-MSCs. Cell growth curves showed a difference between untreated and siTNS3-treated T-MSCs. We also found that when TNS3 was blocked, both total and active *B1*-integrin is significantly reduced, but it didn't recover even after recombinant *B1*-integrin added. Treatment with siTNS3 resulted in a increase in the level of P21, and an overall decrease in the level of ERK, ARK, FAK and JNK in western blotting. Treatment with si*B1*-integrin also had similar results to that of siTNS3. The adipogenic differentiation of T-MSCs was significantly reduced following siTNS3 transfection. The osteogenic and chondrogenic differentiation tended to decreased, but there were no significant differences after transfection with siTNS3.

Conclusions: These findings indicate that TNS3 plays an important role through regulating *B1*-integrin in proliferation of T-MSCs. TNS3 also influences the adipogenic differentiation of T-MSCs.

» **HNOP-73 13:40~13:50**

» GnRH impairs diabetic wound healing via promoting NETosis

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Objectives: Neutrophil extracellular Traps (NETs) impair wound healing in the diabetic condition and inhibiting NET generation (NETosis) could improve wound healing in a diabetic mouse. It was reported that GnRH agonist was associated with a greater risk of diabetes. However, the role of GnRH in diabetic wound healing is not well studied. In this study, we investigated whether GnRH could promote

NETosis and induce more severe delayed diabetic wound healing.

Methods: The diabetic mouse model was induced by 5 times injections with streptozotocin. The mouse's back skin was shaved on day -1 and was administered a 6-mm biopsy punch on day 0. A GnRH agonist and/or a GnRH antagonist was treated in the wound every other day, and the mouse was sacrificed on day 8. NETosis markers, PAD4 and citrullinated H3 were detected with an IHC assay, Western blot or real-time PCR. NETosis was induced with PMA in mouse and human neutrophils and the induction of NETosis was detected with a NETosis assay, electron microscopy, Western blot, Sytox Green staining and real-time PCR.

Results: The GnRH agonist treatment induced delayed wound healing and increased NETosis in diabetic wound skin in mice. By contrast, the GnRH antagonist treatment with a GnRH agonist inhibited the GnRH-induced delayed wound healing. Expression of NETosis markers, PAD4 and citrullinated H3, was increased in the GnRH-treated diabetic wound skin in the mouse and diabetic patients. Furthermore, the GnRH antagonist treatment with a GnRH agonist suppressed the expression of the NETosis markers and PMA-induced NETosis, which are increased by the GnRH treatment.

Conclusions: Our study suggests that GnRH might promote NETosis, and the increased NETosis could induce delayed wound healing in diabetic wound skin. Thus, inhibition of GnRH might be the novel therapy for the treatment of diabetic foot ulcers.

» **HNOP-74 13:50~14:00**

» Contrast-enhanced CT/MRI versus 18F-FDG PET/CT for detection of distant metastasis and synchronous cancer in patients with head and neck cancer

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Jeong Hyun LEE³, Seung-Ho CHOI¹, Soon Yuhl
NAM¹, Sang Yoon KIM¹**

Objectives: Current practice guidelines recommend initial staging work-ups including head and neck CT/MRI combined with chest CT. However, much evidence has shown that whole body screening with 18F-FDG PET/CT provides more sensitive detection of distant metastases and synchronous cancer than conventional imaging. Therefore, we prospectively evaluated the utility of 18F-FDG PET/CT in detection of distant metastasis and synchronous cancer by comparing to conventional imaging.

Methods: This study included a total of 127 consecutive patients with histologically confirmed head and squamous cell carcinoma (HNSCC) between 2010 and 2011. Synchronous cancer was histologically confirmed and distant metastases were confirmed by biopsy or serial imaging follow-ups. McNemer tests was used to compared the diagnostic accuracy of head and neck CT/MRI + chest radiography (CXR), head and neck CT/MRI + chest CT, and 18F-FDG PET/CT.

Results: For distant metastasis, CT/MRI + CXR detected 1 (1%) patients, CT/MRI + chest CT detected 5 (4%) patients, and 18F-FDG PET/CT detected 6 (5%) patients. The differences were 4% ($p=0.06$) and 1% ($p<0.05$), respectively. For synchronous cancers, CT/MRI + CXR detected 4 (3%) patients, CT/MRI + chest CT detected 5 (4%) patients, and 18F-FDG PET/CT correctly detected 10 (8%) synchronous cancers. The differences were 5% ($p=0.007$) and 4% ($p=0.180$), respectively.

Conclusions: 18F-FDG PET/CT detects more distant metastases and synchronous cancer than conventional imaging workups of CT/MRI plus CXR or chest CT.

» **HNOP-75 14:00~14:10**

» **Feasibility of brachial plexus schwannoma enucleation with intraoperative nerve monitoring**

¹Department of Otorhinolaryngology Head and Neck

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**Doh Young LEE¹, Jeong-Yeon JI², Sungjun
HAN², Woo-Jin JEONG², Young Ho JUNG²***

Objectives: Schwannomas are usually benign, single, encapsulated, slow-growing tumors originating from nerve sheaths, while the brachial plexus involvement is very uncommon. Because the brachial plexus innervates the muscles of arm and forearm, impairment of relevant nerve would result in severe functional discomfort. Herein, we describe surgical outcomes of brachial plexus schwannoma removal using the intraoperative neuro-monitoring technique.

Methods: Patients who were treated for brachial plexus schwannoma at Seoul National University Boramae Medical Center and Bundang Hostpital from 2008 to 2017 were included in retrospective chart review. All patients were operated under 100 μ V event threshold of neuromonitoring system (NIM-2[®] or 3[®]). Demographic data, tumor size and location, intraoperative neuromonitoring findings, and postoperative function were evaluated.

Results: Four patients were included in this study. Median size of tumor was 2.4cm (1.6~4.0) and all were arose from divisions and trunks of brachial plexus. Neuromonitoring was performed on following 4 muscles; 1) Deltoid, 2) Biceps brachi, 3) Triceps brachi, and 4) Brachioradialis. The mass and the brachial plexus around the mass were identified after transcervical incision. We checked if there were EMG responses of the muscles on unipolar stimulation of the mass or the nerves of the brachial plexus. Only when the muscles showed no response on stimulation of the mass as high as 1.0mA, resection was started in the manner of enucleation to minimize postoperative functional deficit of arm and forearm. Intraoperative neuromonitoring findings were in accordance with preoperative assessment of included nerve root. Two patients showed no postoperative morbidity, while 1 patient showed temporary postoperative paresthesia of forearm for 2 months and 1 patient had mild

motor dysfunction on grasping for 1 month.

Conclusions: Intraoperative neuromonitoring for arm and forearm muscles gives a chance of successful enucleation of brachial plexus schwannoma with minimal postoperative morbidity.

» **HNOP-76 14:10~14:20**

» **Hypoglossal nerve stimulation: A highly effective, low morbidity alternative for treatment of obstructive sleep apnea in select CPAP-intolerant patients**

*Dep. Otolaryngology. Univ. Alabama at Birmingham
School of Medicine. University Hosp.*

Sean EVANS, Joshua Richman, Kirk WITHROW

Objectives: To determine the therapeutic efficacy of hypoglossal nerve stimulation (HNS) in CPAP-intolerant patients and assess patient characteristics associated with improved treatment response.

Methods: Retrospective review of the first twenty-five consecutive patients treated with HNS by the lead author at a tertiary care academic center. Demographic data, sleep surgical history, pre- and post-operative polysomnography, and sleep endoscopy results were assessed using two sided t-test and linear regression analysis.

Results: Mean age was 67.5 ± 7.6 years, with 42% female. Mean BMI was 28.2 ± 3.8 kg/m². One patient was excluded from analysis for central apnea. In the remaining patients, AHI decreased by a mean of 33.8 events/hr following treatment (95% CI: 25.8-41.7, $p < 0.001$). In bivariate analysis, only pre-intervention AHI was associated with change, with each point of pre-intervention AHI leading to an average decrease of 1.03 points ($p < 0.001$). 83% of patients achieved a treatment AHI < 5 while 92% achieved an AHI < 10 . Mean device use was 49.5 ± 10.4 hours/week. 92% of patients were discharged the day of surgery. No major adverse events occurred.

Conclusions: HNS is a highly-effective, low-morbidity treatment for CPAP-intolerant patients including those

whose AHI and BMI exceeded original inclusion criteria, suggesting an expanded role for HNS in appropriately selected patients.

» **HNOP-77 14:20~14:30**

» **Granuloma gravidarum with ENT manifestation a case series**

Universiti Sains Islam Malaysia

Khairullah A Salina H

Objectives: Objective Pyogenic granuloma is a non neoplastic inflammatory hyperplasia. It arises in response to various stimuli such as local irritation, trauma or hormonal factors. Granuloma gravidarum is a term to describe pyogenic granuloma that occurs during pregnancy. We report a case series of a rare case of nasal granuloma gravidarum and conchal granuloma gravidarum.

Methods: Case Series 1 A 35-year-old-female in her third trimester presented with recurrent epistaxis right sided of her nose for the past one month. Each episode lasted few minutes to hours. It was also associated with an intranasal mass, which was getting bigger. She also had blood transfusion in one occasion. Examination showed a friable, rounded, erythematous mass occupying the right anterior part of nasal cavity. She was treated with excision biopsy under local anaesthesia. The histopathopathology report confirmed Pyogenic Granuloma. Case Series 2 A 27-year old-female in her second trimester presented with a swelling over left outer pinna or concha for two weeks duration. She has been on antiplatelet agent for antiphospholipid syndrome. She was treated conservatively with antibiotic ointment and the mass subsequently regressed.

Conclusions: In conclusion granuloma gravidarum is common in pregnant women. However its occurrence extragingly is a rare entity. The management of this case follows the recommendations in the literature which are complete excision of the lesion and some conservative measures.

» **HNOP-78 14:30~14:40**

» The possible association between oral health and sleep duration

Department of Otolaryngology-Head and Neck Surgery, Catholic University College of Medicine

Yun-Jin Kang, Ki-Beom KOH, Yong-Jin PARK, Jung-Hae CHO

Objectives:The aim of this study was to investigate the association between oral health and sleep duration in South Korean subjects using 2010-2015 data from the Korean National Health and Nutrition Examination Survey (KNHANES).

Methods:Cross-sectional data on 35, 599 adults over the age of 19 years who completed KNHANES were analyzed. All participants reported subjective oral health status and their daily average sleep duration using a self-reporting questionnaire. Sleep duration and oral health status were classified into three categories as follows, respectively: ≤ 5 , 6-8, ≥ 9 h/day and good, average, poor.

Results:The overall prevalence of poor oral health status was 43.8 %. Univariate analysis demonstrated that oral health status was significantly associated with sex, age, social economic status, depression, marital status, and sleep duration. After adjustment for covariates (age, sex, HBP, diabetes mellitus, smoking status, alcohol consumption, exercise, income, education level, depression, marital status), a sleep duration of ≤ 5 h (OR = 1.243; 95% CI, 1.069 - 1.446) and a sleep duration of ≥ 9 h (OR = 1.211; 95% CI, 1.008 - 1.455) were significantly associated with poor oral health, compared to a sleep duration of 6-8h.

Conclusions:This is the first study to show that both short and long sleep duration were significantly associated with the development of poor oral health status.

» **HNOP-79 14:40~14:50**

» The role of TRPV1 via sonic hedgehog on taste buds development in xerostomia mouse model

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Jeong Hwan MOON^{1, 2, 3}, Yun-Hee RHEE², Young-Hoon CHOI³, So Young PARK³, Sang Joon LEE^{1, 2, 3}, Phil-Sang CHUNG^{1, 2, 3}

Objectives:Clinically, patients who have dry mouth syndrome often felt pain or tasteless. Taste cells differentiate from surrounding epithelium and turn over in a continuous replacement cycle with life spans from 3 to 30 days, and fungiform papillae is important to the functional activity of taste buds. However, the regulation of taste cell differentiation, turnover and maintenance of sensation are not well understood. In the taste system, transient receptor potential vanilloid type 1 (TRPV1) has known to be a sensory nerve development factor by the regulation of cell proliferation and sonic hedgehog (SHH) has a crucial role in paracrine signaling to HH-responding cells in perigemmal, basal epithelial and stromal cells. In this study, we hypothesized that TRPV1 has an effect on the differentiation and development of fungiform papillae and SHH signaling is involved in this process.

Methods:Xerostomia mouse model was established in C57BL/6 mice by extraction of 3 major salivary glands. The mice were divided into 3 groups; untreated/TRPV1+, salivary glands deleted/TRPV1+, and untreated/TRPV-. We observed the morphological differentiation of fungiform papillae and neurofilament of each group using hematoxylin and eosin (H&E) staining and immunofluorescence (IF) staining. In addition, we evaluated the expression of SHH and stemness of taste bud cells of each group using western blot analysis and IF staining.

Results:We observed the atypical form of taste buds and fungiform papillae in dry mouth induced mice both salivary glands deleted/TRPV1+ and TRPV1-. We also observed a number of nerve fibers and the expression of SHH were decreased in dry mouth-induced TRPV1+

mice. The keratin-positive cells in top of fungiform papillae were collapsed and the expression of GLI1; the signaling transcription factor was also diminished in dry mouth-induced TRPV1+ mice.

Conclusions: Our results indicated that TRPV1 expression influenced taste bud development and differentiation in taste sensation which was down regulation of SHH signaling pathway.

» **HNOP-80 14:50~15:00**

» Survival impact of the delayed radiotherapy initiation in patients with head and neck cancer

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University of Ulsan College of Medicine*

Chol-Ho SHIN, Turki ALMUHAIMID, Manal Ibrahim BINMANIE, Ah-Ra JUNG, Jae-Ryung LEE, Yoon-Se LEE, Jong-Lyel ROH, Seung-Ho CHOI, Sang-Yoon KIM, Soon-Yuhl NAM

Objectives: In an organ preservation strategy, the role of radiotherapy in head and neck squamous cell carcinoma (HNSCC) is increasing. This study aimed to evaluate the impact of delaying radiotherapy on recurrence and survival in patients with HNSCC.

Methods: Between 2012 and 2014, patients who underwent radiotherapy or concurrent chemoradiotherapy for HNSCC were enrolled. Patients with recurrent disease at initial presentation, early lost to follow-up or treatment in palliative settings were excluded. Patients were categorized into two groups according to the time between diagnosis and starting radiotherapy: <30days and ≥30days. Univariate and multivariate analyses using Cox proportional hazards model were used to determine clinicopathologic characteristics associated with recurrence-free survival (RFS) and overall survival (OS).

Results: Total 73 patients were reviewed, including 28 (38%) oropharyngeal, 26 (36%) laryngeal and 19 (26%) hypopharyngeal cancers. The median time to radiotherapy initiation (TRI) was 1.1 months (range 0-9.6). Univariate

analyses showed that age (>60 years), histologic grade, and overall stage were significant prognostic factors for RFS (<0.05). There were no difference in RFS or OS (all p>0.05) between early and late initiation groups. TRI was not significantly related to recurrence or survival.

Conclusions: Our findings suggest that delayed initiation of radiotherapy was not associated with poorer survival.

HNOP XIV

RM 2-3 (White Heron)

Chair : Jeong Pyo BONG, Kwang Jae CHO

Neck

» **HNOP-81 15:20~15:30**

» The updated AJCC / TNM staging system for papillary thyroid cancer (8th edition): The perspective from a genomic analysis

Department of Otolaryngology-Head and Neck surgery, Kangnam Sacret Heart Hospital, Hallym University College of Medicine, Seoul, South Korea

Bum Sang LEE, Soo Kyung JANG, Jin Hwan KIM, Il Seok PARK, Young Soo RHO, Dong Jin LEE

Objectives: Recently, the American Joint Committee on Cancer (AJCC) published the 8th edition of the Cancer Staging Manual. However, as of yet, there have been few reports about the effect of down-staging when using the 8th edition for anticipating overall survival (OS) or recurrent free survival (RFS) in PTCs in a clinical setting. The aim of the present study was to compare OS and RFS with different cutoff values (age 45 vs. age 55) using the clinical data of 505 PTC cases in The Cancer Genome Atlas (TCGA) data. Also, we evaluated here the effect of down-staging in AJCC8th to survival and recurrence of PTCs. We also used multiplatform genomic analysis to compared

gene expression data, altered canonical pathways, copy number alteration and somatic mutation profiles according to age distribution

Methods: We downloaded gene expression data, somatic mutation profile, copy number alteration data and clinical data of 505 papillary thyroid cancer patients from TCGA data portal (<https://tcga-data.nci.nih.gov>) and cancer browser (<https://genome-cancer.ucsc.edu>). We used multiple statistical analysis and multiplatform genomic analysis to evaluate the effect and difference of AJCC 8th staging manual when compared to AJCC 7th.

Results: When we used age 55 years as a cut-off value instead of age 45 as recommended in AJCC 8th, Kaplan-Meier(KM) plot showed much significant p value ($p=0.493$ vs $p=0.006$ in RFS and $p=4.4 \times 10^{-5}$ vs $p=1.1 \times 10^{-9}$ in OS). When we compared KM plot according to different stage using AJCC 7th and AJCC 8th, AJCC 8th staging system showed much significant p value ($p=0.048$ vs $p=3.1 \times 10^{-9}$ in RFS and $p=5.9 \times 10^{-10}$ vs $p=2.2 \times 10^{-10}$ in OS). Multiplatform genomic analysis showed that age group older than 55 years showed 103 differently expressed genes (DEG) when compared with other age groups. Canonical pathway analysis revealed that age group older than 55 years had altered pathways associated with aggressiveness of thyroid cancer

Conclusions: In conclusion, this study is the first study to show clinical and genetic evidence supporting the altered age cutoff point of 55 years in the 8th edition of the AJCC Cancer Staging Manual for PTC patients. Analysis of not only clinical data but also gene expression data, copy number alteration data, altered canonical pathway, and somatic mutation profile revealed that the 8th edition's staging system can more accurately predict recurrence and also survival rate compared to the 7th edition.

» **HNOP-82 15:30~15:40**

» Prognostic value of ^{18}F -FDG PET/CT parameters in patients with salvage treatments for recurrent squamous cell carcinoma of the larynx and hypopharynx

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Jae Ryung LEE¹, Turki ALMOHIMMED², Jungsu S OH³, Jong-Lyel ROH², Jae Seung KIM³, Seung-Ho CHOI², Soon Yuhl NAM², Sang Yoon KIM²

Objectives: Recurrent laryngeal/hypopharyngeal squamous cell carcinoma (LHSCC) is commonly associated with poor survival outcomes. We evaluated the prognostic role of ^{18}F -FDG PET/CT parameters quantitatively measured in patients with salvage treatments for recurrent LHSCC.

Methods: This study involved 100 consecutive LHSCC patients who underwent ^{18}F -FDG PET/CT for recurrent staging and subsequent salvage treatments. Maximum, mean, and peak standardized uptake value (SUV_{max} , SUV_{mean} , and SUV_{peak}), metabolic tumor volume (MTV), and total lesion glycolysis (TLG) were measured on ^{18}F -FDG PET/CT. Cox proportional hazards regression analyses were used to assess the associations between quantitative ^{18}F -FDG PET/CT parameters and other clinicopathological factors with progression-free survival (PFS) and overall survival (OS).

Results: Two-year post-salvage PFS and OS rates were 67.9% and 75.6%, respectively. All the ^{18}F -FDG PET parameters of SUV_{max} , SUV_{mean} , SUV_{peak} , MTV, and TLG were significantly associated with poor PFS and OS outcomes after salvage treatment (all $P < 0.05$). Multivariate analyses showed that Karnofsky performance score, recurrent site, and TLG were the independent variables predictive of both PFS and OS (all $P < 0.05$). High value of TLG (> 16.1 g) at recurrent lesions was associated with ≥ 2 -fold increased risk of tumor progression and disease-specific mortality.

Conclusions: Of quantitative measurements using ^{18}F -FDG PET/CT, TLG can be useful in predicting post-treatment recurrence and survival in patients with recurrent LHSCC.

» **HNOP-83 15:40~15:50**

» Level I neck nodes involvement in advanced malignancy of the larynx and the hypopharynx

*Dep. of Otorhinolaryngology, Kasr Al Ainy Hosp.,
School of Medicine, Cairo Univ.*

**Mohamed SALAH, Ahmed AL FAROUK, Osama
HASSAN, Osama METWALLEY**

Objectives: Detect the prevalence of level I neck lymph node or submandibular gland metastases in laryngeal and/or hypopharyngeal tumors. analyze complications of level I neck dissection and submandibular gland excision whether intraoperative or postoperatively.

Methods: This study included 30 patients who were subjected to surgical treatment for advanced laryngeal and/or hypopharyngeal tumors, including neck dissection. we included advanced laryngeal and/or hypopharyngeal malignancy T3, T4a and N2 and N3. Total laryngectomy was done for all cases with adding level I dissection to various types of neck dissection

Results: This study include 27 males and 3 females with mean age of 54.8 years. NON OF THE THIRTY PATIENT HAD METASTASIS IN LEVEL I LN OR THE SUBMANDIBULAR GLAND Only 3 patients (10%) had a past history of receiving radiotherapy laryngeal carcinoma cases were 28 patient, while two patients had hypopharyngeal carcinoma/ Tongue base and vallecula were invaded by the tumour in 11 patients (36.7 %). 20 patients (66.7%) were classified as T3, while 10 patients (33.3 %) were considered as T4a, four patients (13.3 %) were N2 and 5 patients (16.6%) were N3. 10 patients (33.3%) were proved pathologically to have positive neck lymph nodes for malignancy None of those patients had affected level I neck lymph nodes or the submandibular gland Only one patient (3.3%) suffered from injury of the marginal mandibular nerve. Three patients (10%) complained of persistent not-improving significant xerostomia or dry mouth postoperatively however those patients had received radiotherapy

Conclusions: Our findings support the previous recommendations that there is no need for prophylactic level I neck dissection in the absence of clinically palpable suspicious lymph nodes. Special attention to increase the sample size and, to use immunohistochemistry markers in detecting micrometastasis in further studies

» **HNOP-84 15:50~16:00**

» Clinical application of fluorescence imaging for robotic elective neck dissection in oral cavity cancer

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Objectives: Oral squamous cell carcinoma (OSCC) has tendency to migrate through the lymphatic system and the occult neck node metastasis is relatively frequent. The aim of this study was to evaluate the clinical feasibility of the fluorescence imaging for robotic elective neck dissection in oral cavity cancer patients.

Methods: Indocyanine green (ICG) was injected into the 4 quadrants around the primary tumor at 12 hours prior to surgery. During the robotic elective neck dissection, ICG-stained nodes were identified and retrieved under guidance of Firefly system[®]. After whole surgical procedure, remnant ICG-unstained nodes were dissected from the specimen and sent them separately to confirm the presence of metastasis.

Results: 9 adult patients diagnosed with T1-2, cN0 OSCC were consecutively recruited for this study. ICG guided intraoperative and ex-vivo node sampling using fluorescence imaging was done successfully in all of patients. 25 ICG-stained nodes were detected in total of 287 retrieved LNs. ICG-stained nodes were identified in all patients and

histopathologic metastatic nodes were found in 2 patients. The SLN detection rate, upstaging rate and false-negative rate were 100%, 22%, and 0%, respectively.

Conclusions: ICG guided fluorescence imaging might be useful in detection of clinically unidentified lymph node metastasis in early OSCC patients. In the future of robotic head and neck surgery, fluorescence imaging technique might be useful in determining the optimal extent of neck dissection.

» **HNOP-85 16:00~16:10**

» Internal jugular vein delayed blowout red signs when mistaken can lead to a fatal complication

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Faculty of medicine, Cairo Univ.*

**Ahmad ELTELETY, MD, Ahmed EL BATAWI,
MD, Ahmed NASSAR**

Objectives: Vascular blowout is a serious and fatal complication which may occur after major head and neck ablative surgical procedures. Though being fatal, it is rarely documented in the literature being an uncommon surgical sequela. Delayed rupture of the internal jugular vein (IJV) is a scarce event that may follow resection of primary or regional malignant disease from the neck. In this review, we are sharing our experience at Cairo University Hospitals which we gained over the last four years.

Methods: Medical records of more than 300 patients with head and neck malignancy were retrospectively reviewed. Data analyzed included the site of the primary tumor, type and laterality of neck dissection, clinical course of their recovery, onset of alarming signs, incidence and timing of the delayed rupture of the IJV.

Results: Over 500 neck dissection of various types were performed. Eight patients developed delayed blowout of the IJV. Three cases out of eight were saved with no subsequent morbidities, one had major morbidity and four cases were lost.

Conclusions: Delayed IJV blowout is a rare major

complication with high mortality rate. It has almost a typical presentation with recurrent attacks of massive venous bleeding - while the patient in between the attacks is symptom free - after about 2 weeks postoperatively. These on and off attacks continue for 2-3 days before the fatal blowout happens. Recognizing this typical presentation with the other signs helps saving patients in the future.

» **HNOP-86 16:10~16:20**

» Cervical metastasis from non-head & neck sites: Below the diaphragm

*Dept of Otorhinolaryngology – Head & Neck Surgery,
Seoul National University Bundang Hospital*

**Jinil KIM, Jungirl SEOK, Minhyung LEE, Sung
Jun HAN, Young Ho JUNG, Soon Hyun AHN,
Woo-Jin JEONG**

Objectives: Cancers of the abdominal or pelvic organ occasionally metastasize to the cervical lymph nodes. Although cervical metastasis suggests advanced stage, for cancer of the abdominal or pelvic organs, cytoreductive surgery for some cancers is known to have survival gain. The aim of this study was to analyze the clinical features of neck metastasis in patients with cancers of the organs under the diaphragm. The aim of this study was to analyze the clinical features of neck metastasis in patients with cancers of the organs under the diaphragm.

Methods: We analyzed the patients with cancer of the non-head and neck origin, especially from under the diaphragm, who underwent fine needle aspiration of cervical lymph node at Seoul National University Bundang Hospital in 2017.

Results: Of the 50 patients with neck metastases, stomach cancer and colon cancer were the most common, followed by prostate and ovarian cancer. The most common site of neck metastasis was left supraclavicular lymph node (a.k.a Virchow's node) (86%). 82% of cases of neck metastasis were found on chest CT, 10% by PET, and 8% were either visible or palpable. 76% were treated with chemotherapy

and 3 patients had to stop treatment due to the terminal stage. Two patients underwent neck dissection and one underwent palliative radiotherapy. 72% patients were alive with disease (AWD), and 18% patients died of the disease (DOD). 10% of the patients were lost to follow up.

Conclusions: When a patient with Virchow's node is encountered, careful attention should be paid to metastasis from below the diaphragm. Proper patient counselling with due respect to the dismal prognosis of the patients should be instituted. counselling with due respect to the dismal prognosis of the patients should be instituted.

» **HNOP-87 16:20~16:30**

» Establishment of indications and operative techniques of robot-assisted neck dissection for head & neck and thyroid cancer_ Analysis of unmet needs based on experiences of over 300 cases in 7 years

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Ruby ROBLES¹, Chan LEE¹, Da Hee KIM¹, Joo Hyun KIM², Hyung Kwon BYEON³, Won Shik KIM⁴, Se-Heon KIM¹, Eun Chang CHOI¹, Yoon Woo KOH¹

Objectives: Since the first robot-assisted neck dissection (RAND) in 2010, the authors have actively practiced RAND via retroauricular approach and continuously reported its feasibility for both node negative and positive necks in various head & neck and thyroid cancers. Here we intend to report the establishment of the indications and operative techniques of RAND and discuss what would be the unmet needs based on experiences of more than 300 cases for improving the results of RANDs.

Methods: Among Between 2010 and 2017, 306 patients (199 patients for head & neck cancer(HNC) and 107

patients for thyroid cancer(ThyC)) have undergone RAND at Severance hospital. Data was retrospectively collected and comprehensively analyzed on parameters such as patient characteristics, tumor characteristics, surgical approaches, perioperative outcomes and complications.

Results: All cancers from head and neck were included in the HNC group and majority of the ThyC group was papillary thyroid cancer. There were 169 males and 137 females with a median age of 47.8 years. Among 199 HNC patients, facelift or RA approach has been used in 195 patients (98%). Among 107 ThyC patients, 73 patients (68%) have been operated with RA approach. Since 2013, only Facelift or RA port was used as an approach. Operation time for unilateral neck dissection sequentially decreased since 2010, reaching 167 minutes for MRND(Level II-V) and 114 minutes for selective ND during the latest 1 year. All rates for complications decreased. Highly precise and fine plane dissection could be conducted with applying 10 times magnified 3D HD vision, the use of three arms, and the tremor filtering system.

Conclusions: A skilled surgeon is required for robotic neck dissection but there is still room for improvement as the current robotic system was developed mainly for laparoscopic approaches. Smaller incision and port, shorter operating time, and fast learning curve is expected after application of the Single Port(SP) System in near future.

» **HNOP-88 16:30~16:40**

» Reconstruction of circumferential pharyngeal defect after total laryngopharyngectomy- Tubing of flap vs C-shaped pharyngeal reconstruction utilizing prevertebral fascia as a posterior wall

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Won Shik KIM¹, Eun Jae CHUNG¹, Soon Hyun AHN¹, Eun Chang CHOI²

Objectives: Reconstruction after total laryngopharyngectomy is a challenge for head and neck surgeon. Tubing of a fasciocutaneous flap is one option and C-shaped pharyngeal reconstruction utilizing prevertebral fascia as a posterior wall is another. We aimed to compare the clinical outcomes of both methods.

Methods: Patients undergoing circumferential pharyngoesophageal reconstruction with tubed anterolateral thigh (ALT) free flap (tubing group) were reviewed and compared with the patients with C-shaped pharyngeal reconstruction with ALT free flap or pectoralis major myocutaneous (PMMC) flap utilizing prevertebral fascia as a posterior wall (patch group).

Results: Six patients underwent tubed anterolateral thigh free flap for reconstruction. Three patients underwent C-shaped pharyngeal reconstruction with ALT free flap utilizing prevertebral fascia as a posterior wall and 1 underwent patch style-PMMC flap reconstruction utilizing prevertebral fascia as a posterior wall. Fistulas were developed in 2 patients (33%) among tubing group and 1 patient (25%) among patch group. 3 (50%) developed stenosis in tubing group. No stenosis was reported in patch group. There were no perioperative deaths.

Conclusions: Patients with circumferential pharyngeal defect after total laryngopharyngectomy can be successfully managed with tubing of flap or patch style-reconstruction utilizing prevertebral fascia as a posterior wall. Stenosis after circumferential reconstruction was not developed in patch group. A study with increased cases will follow to confirm the benefits of these methods.

» **HNOP-89 16:40~16:50**

» **Safety of the drainless excision of the submandibular gland**

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University, Seoul, Republic of Korea

Seung Hee BAE¹, Kang Hyun LEE¹, Sung Min LEE¹, Ju Yeon KIM², Mi Sun CHUN², Soo Yeon JUNG², Han Su KIM², Hae Sang PARK¹

Objectives: Percutaneous drains have several associated complications, including infection, fistular formation, discomfort, and prolonged hospital stay. The aim of this study was to determine the safety of the submandibular gland excision without the use of surgical drains.

Methods: We retrospectively analyzed the surgery time, postoperative complications (postoperative bleeding, facial palsy, seroma, and repeat exploration of wounds) and duration of the hospital stay. Excision of the submandibular gland via transcervical approach was undertaken by two surgeons. Prior to wound closure, the skin flap and wound bed were approximated using hemostatic fibrin glue (GREENPLST-Q PFS KIT®, GC Greencross, Youngin, Korea). Saline irrigation was not performed after the specimen was removed.

Results: A total of 18 patients underwent submandibular gland excision. The study group consisted of 8 men (44.4%) and 10 women (55.6%) (mean age, 46.3 years; range, 24-70 years). There were no major surgical complications. One patient had minor bleeding on incision line of the skin which was easily controlled by bipolar cauterization. A total duration of the surgery from skin incision to closure was 41.89 minutes. Mean duration of the hospital stay was 3.2 days. All patients discharge on the average of 1.22 days after surgery.

Conclusions: Excision of the submandibular gland can be safely performed without the use of surgical drain, therefore, allowing patient to leave the hospital earlier.

OTPX

RM 1-1 (Exhibition Hall B)

Otology Poster Exhibition

» OTPX-01

» Surgical ligation of large mastoid emissary vein
complaining with pulsatile tinnitus

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University, Jeonju, Korea*

**Su-Geun KIM, Ji-Seob YOO, Jong-Hwan LEE,
Cha-dong YEO, Eun-ji KIM, Jun-Sun KIM, Jong-
Hun SONG, Baek-Hwa HAN, Eun-Jung LEE**

Pulsatile tinnitus is an uncommon symptom characterized by a perceived pulsatile sound synchronous with the heartbeat. We report a rare case of a patient with unilateral pulsatile tinnitus induced by large, prominent mastoid emissary vein. A 45-year-old woman visited our hospital with pulsatile tinnitus. She had a persistent tinnitus for 20 years and her symptoms worsened from two years ago. It was said that there was a sound in accordance with the heartbeat sound. She has had some hearing impairments in both ears for a long time due to long-term otitis media. The temporal bone CT result was a large right jugular bulb. And a mastoid emissary vein canal draining into the right sigmoid sinus was large. Therefore, we decided to perform a large mastoid emissary vein ligation with the planned right tympanoplasty. On follow-up, the patient's tinnitus was partially improved. According to reviews, surgical ligation of large mastoid emissary vein as a treatment for pulsatile tinnitus was the first case. So we report this case with a review of the literature.

» OTPX-02

» A rare case of actinic keratosis of external

auditory canal

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Medicine, The Catholic University of Korea, Seoul,
Korea*

**Jung Mee PARK, Jung Ju HAN,
Kyoung Ho PARK**

A 65-year-old female with a right-sided ear fullness combined with severe otalgia and otorrhea visited our outpatient clinic. Oto-endoscopic examination revealed a whitish mass like lesion invading the inferior portion of the external auditory canal. Audiological examinations were non-specific. The computed tomography findings and initial pathological report of the biopsy pointed towards an external auditory canal cholesteatoma. Even after the resolution of acute inflammation with an antibiotic otic drop, the patient still complained of a severe otalgia. Surprisingly, the second biopsy of the mass was pathologically diagnosed as an actinic keratosis. After an operation of the wide excision of mass with split-thick skin graft from the left thigh, the lesion site was completely healed without any complication.

» OTPX-03

» Unusual case of acute otitis media, a
manifestation of deep tissue infection of naso-
parapharynx

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**Joo-Hyun SHIN, Ki-Hwan KWAK, Sung-Hee
KIM, Jun-Ho PARK, Tae-Hoon KIM,
Eun Jung LIM**

Acute otitis media is quite frequently seen in clinic and treated easily with oral antibiotics in most cases. However in some intractable disease, it can be related to deep tissue infection of naso-parapharynx. Deep tissue infection of

naso-parapharynx presenting acute ear inflammation is rarely reported and hard to be recognized because the mucosal surface of nasopharynx can be clean. The symptoms are quite similar to skull base osteomyelitis except for lack of bony involvement. On contrast enhancement MRI imaging, the lesion shows high signal in naso-parapharynx area. In case of intractable ear infection, close examination of nasopharynx and imaging is necessary, and for the questionable lesion thorough tissue biopsy is mandatory. Here we present a 52-year-old man presenting with severe otalgia and deep facial pain which do not improve by 28-day oral antibiotics, who was ultimately diagnosed as deep naso-parapharyngeal infection.

» **OTPX-04**

» Tuberculosis of the middle ear with neck lymph nodes

Department of Otorhinolaryngology-Head and Neck Surgery, College of Medicine, Chonbuk National University, Jeonju, Korea

Eun Ji KIM, MD, Jong Hwan LEE, Su Geun KIM, Jun Sun KIM, Baek Hwa HAN, MD, Eun Jung LEE, MD, PhD

Extrapulmonary tuberculosis comprises about 20% of all cases of tuberculosis (TB) in Korea. The most common site of Korea were pleura, followed by lymph nodes, gastrointestinal organs, bones and joints, central nervous system (CNS). Tuberculosis of the middle ear is a rare disease. There are only few cases reported in the medical literature so far. We report a case of tuberculosis of middle ear with lymph node on neck. Patient had recurrent severe granulation of middle ear. Patient is referred to as confirmed tuberculosis in enlarged neck lymph node after tympanomastoidectomy, even though biopsy was performed for the diagnosis before surgery, during and after surgery.

» **OTPX-05**

» Chronic internal jugular vein thrombosis due to cholesteatoma

Department of Otolaryngology-HNS, Institute for Medical Science, Chonbuk National University-Chonbuk National University Hospital, Chonbuk, 560-182, Korea

June Sun KIM, MD, Baek Hwa HAN, MD, Yeon Suk YU, MD, Eun Jung LEE, MD, PhD

Lateral sinus thrombosis(LTS) is a rare complication of middle ear diseases. If a thrombus develops in response to infection, it lead to cerebral venous sinuses and to the internal jugular vein. In the preantibiotic era, LST often led to septic emboli and death in the majority of patients. Complications from LST have become rarer since the introduction of antibiotics and intravenous fluid administration. However, 67-year old female came to our hospital, who fell ill with one-sided headache and otorrhea and was diagnosed as a LTS, which extended to internal jugular vein on computed tomography. We present a case of LST in which they describe the clinical approach and the related literature review.

» **OTPX-06**

» A case of single site fixation after failure of transcutaneous active bone conduction device

Department of Otolaryngology, Seoul National University, Boramae Medical Center

Ye ji SHIM, Sang Yoon HAN, Sun A HAN, Young Ho KIM

We report postoperative result after single site fixation of a transcutaneous active bone conduction implant (Bonebridge). One year ago, 65 year-old man underwent the implantation of a transcutaneous active conductive hearing implant (Bonebridge). He complaint the malfunction of Bonebridge 1 year after implantation.

Evaluation of device function revealed the failure of internal device. In the device replacement surgery, old device was removed and new screw sites were determined. The fixation of new device transducer was tried, but one site's screw hole was widened accidentally. One screw was not fixed despite numerous attempts. After surgery, functional test showed favorable result. The patient experienced comfortable bone conduction sounds and there was no complication 2 months after surgery. Single site fixation of a transcutaneous active bone conduction implant (Bonebridge) can show a favorable result.

» **OTPX-07**

» Two cases of autologous platelet-rich plasma intra tympanic injection on patients with sensory neural hearing loss

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Jung Jun HAN, Jung Mee PARK, Shi-Nae PARK, Sang Won YEO, Kyoung Ho PARK

Introduction:Platelet-rich plasma (PRP) is a concentrate of platelet-rich plasma protein derived from whole blood, centrifuged to remove red blood cells. It has a greater concentration of growth factors than whole blood. Expecting for healing of damaged spiral ganglion and hair cell, we performed intra tympanic PRP injection(IT-P) for the patients who did not respond to more than one month's conventional treatment.

Case Report I:A 71 years-old woman visited our clinic by left sudden hearing loss occurred 2weeks ago. She was treated for 2 weeks with oral steroid medication in another hospital. We did 8 times intra-tympanic steroid injection(ITS), after one month, we did 4 times IT-P. A subjective symptom was improved but audiology was not changed.

Case Report II:A 48 years-old man visited our clinic by left sudden hearing loss 10months ago that persisted after

conventional treatment. When visiting, left ear was 82.5dB, we did 4 times IT-P and 1 month after IT-P, there's no improvement.

Discussion:We performed IT-P in two patients and no significant improvement was observed. The limitations of this study are short follow-up periods and small size of subject numbers.

» **OTPX-08**

» Difficult mapping in a child with developmental delay a case of changing in electrical stimulation levels over time

Department of Otorhinolaryngology-Head and Neck Surgery, College of Medicine, Chonbuk National University

Cha-Dong YEO, Ji-Seob YOO, Jong-Hwan LEE, Su-Geun KIM, Yeon-Seok YOU, Jun-Sun KIM, Jong-Hun SONG, Baek-Hwa HAN, Eun-Jung LEE

In recent years, improvement in speech perception of children with cochlear implants(CI) has been attributed to the younger age of implantation. The ability to maximize the full potential of a CI is dependent on an optimal map. Mapping includes the programming of minimum and maximum stimulation levels that are based on subjective measurements of thresholds and most comfortable levels. The difficulty in obtaining thresholds and comfortable levels in younger children urged the development of electrophysiological tools for predicting these parameters. A recent technologic development known as neural response telemetry(NRT) allows the recording of the electrically evoked compound action potential(EAP) in the Nucleus device. We present the case of developmental delayed child who received CI both side sequentially. During surgery, NRT was normal in both side, but postoperative NRT was changing in electrode over time. Recently, NRT showed normal again in both side. Children with developmental delay may need Advanced NRT and Categories of Auditory

performance(CAP) score for mapping.

» **OTPX-09**

» Facial nerve palsy caused by otomycosis
Treatment with neurorrhaphy

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**June Sun KIM, MD, Baek Hwa HAN, MD, Su
Geun KIM, MD, Eun Jung LEE, MD, PHD**

Otomycosis is a fungal infection that affects the ears. It mostly affects people who live in warm or tropical areas. The infection begins in the external auditory canal, typically presenting with severe otalgia and purulent otorrhea; it can rapidly spread via the ear canal soft tissue to the temporal bone resulting in osteomyelitis and subsequent cranial nerve palsies and intracranial infection. We present a case of 77 years male, who present right facial nerve palsy. The patient was a cholesteatoma and had a previous history of surgery one year ago. One month prior to admission, he was on treatment with otalgia and otorrhea. We confirmed otomycosis and about 7mm temporal segment of facial nerve defect, so subtotal petrosectomy and neurorrhaphy with sural nerve graft. We present a case in which they describe the clinical approach and the related literature review.

» **OTPX-10**

» A case of autoimmune inner ear disease
mimicking bilateral mnires disease

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Korea*

Hong-Ju KIM

Autoimmune inner ear disease(AIED) is a rare disease,

accounting for <1% of all case of hearing impairment or dizziness. It is characterized by sensorineural hearing loss(SNHL) or vestibular dysfunction that result from an immune-mediated process. Clinical feature of AIED is SNHL that progresses over weeks to months and fluctuating hearing symptoms. Because there's no diagnostic laboratory test, clinical features and response to immunosuppressive therapy were important for diagnosis of AIED. Many disease such as sudden sensorineural hearing loss and Meniere's disease may also mimic AIED, a broad differential must be maintained in patients suspected of having AIED. We report a case of a 46-year-old female who presentation with sudden hearing loss and vertigo. We could diagnose her as AIED with systemic lupus erythematosus(SLE). The symptoms were improved treated with steroids.

» **OTPX-11**

» A case of abnormal FN lateralization blocking
RW in a CI case of mondini anomaly

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Univ College of Medicine*

**In Hak CHOI, Hyunjung KIM, Euyhyun PARK,
Im Gi JUNG**

Most of inner ear malformations arise during 1st trimester of pregnancy as a result of abnormal formation of membranous labyrinth. Common causes are known as genetic error or rubella, CMV infection or radiation. Inner ear malformation can be divided into anomaly of membranous labyrinth and osseous, membranous labyrinth. Inner ear malformation caused by incomplete partition develops during 3-7th week of gestation and partially or completely lacks interscalar septum. There are 3 variants and among these, type II malformation is known as mondini malformation. Most patients of Mondini malformation have sensorineural hearing loss which is usually bilateral. Abnormal cochlea of only 1.5 turns instead of normal 2.5 turns can be found in radiographic

features and hearing can be improved by implantation of multichannel cochlear implant. We present a case report of anomalous facial nerve with cochlear malformation, incomplete partition type II in which extreme care was needed in the process of cochleostomy.

» **OTPX-12**

» A case of bilateral posterior semicircular canal dehiscence with conductive hearing loss

Department of Otorhinolaryngology-Head and Neck Surgery, College of Medicine, Chonbuk National University, Jeonju, Korea

Yeon Seok YOU, June Sun KIM, Eun Jung LEE

Posterior semicircular canal dehiscence (PSCD) is described as a third-window lesion that manifest various auditory symptoms - such as; autophony, conductive hearing loss, aural fullness, hearing loss, and pulsatile tinnitus - or vestibular symptoms - such as; vertigo, the Tullio phenomenon, and Hennebert sign. We encountered a 50 year-old women who presented symptoms that suggested PSCD. She complained of left tinnitus that had started several years ago, with accompanied left hearing loss. Since the patient described her hearing loss to be worsening, we performed a pure tone audiometry. Audiometry results were compatible with conductive hearing loss in both ears. A temporal bone CT was taken, and bilateral PSCD was found.

» **OTPX-13**

» Clinico-radiologic characteristics of necrotising otitis externa - A pictorial review

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Mei Fen CHIA¹, Narayana Shenoy JAGADISH²

Necrotising otitis externa is a debilitating and potentially life threatening condition affecting predominantly

immunocompromised patients. These patients may present with varied or non-specific symptoms, ranging from headaches, otalgia, otorrhea and fever. The disease may progress rapidly in a clinically susceptible patient. Hence an early and timely diagnosis is key to effective treatment and prevention of complications. Imaging studies are important tools for early diagnosis of this disease. Several classical imaging characteristics and clinical findings are illustrated to aid in the diagnosis of this condition.

» **OTPX-14**

» Engorged hard tick in the external auditory canal of in infant

Department of Otorhinolaryngology-Head and Neck Surgery, School of Medicine, Catholic University of Daegu

Yee-Hyuk KIM

An oval-shaped mass with a smooth surface was found in the ear canal of a 22-month-old male infant. Although the mass appeared to be almost entirely blocking the ear canal, it was successfully removed under a surgical microscope without general anesthesia at the outpatient department. Under an optical microscope with hematoxylin and eosin staining, the specimen was observed to have a cuticle with a serrated surface and a pore canal, as well as parts of the capitulum, salivary glands, muscles, midgut, and the legs. The specimen was identified as a hard tick of the family Ixodidae, based on gross and histological findings. This is the first case in Korea on the diagnosis and treatment of a tick bite in the ear canal.

» **OTPX-15**

» A case of fibrous dysplasia of the temporal bone mimicking cholesteatoma

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Korea

**In Hye KIM¹, Jung Mee PARK², Jung Ju HAN³,
Shi Nae PARK⁴**

Abstract Fibrous dysplasia is a bone disorder of unknown origin in which normal bone is replaced with fibrotic tissue and disorganized bone trabeculae. The temporal bone is known to be rarely affected. Because of the slowly progressive course of the disease, many cases are diagnosed incidentally through an imaging study without any symptom. Here, we report one rare case of histologically confirmed fibrous dysplasia of the temporal bone which was initially misdiagnosed as a cholesteatoma in the both imaging studies of temporal bone CT and MRI. Surgical outcomes of hearing and symptomatic relief were satisfactory in this 25 year old symptomatic female patient.

» **OTPX-16**

» Cochlear implantation with middle ear anomaly:
One case report

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**Jong Hoon SONG¹, Eun Ji KIM², Su Geun KIM³,
Eun Jung LEE⁴**

The advent of universal neonatal hearing screening in some countries and the availability of screening programs for at-risk infants in other countries has facilitated earlier referral, diagnosis, and intervention for infants with hearing loss. So the current study hypothesized that earlier implantation would lead to increased rates of language acquisition as the children were still in the critical period for their development. On the other hand, middle ear malformations are not frequent but may present in a variety of ways. A non-progressive and conductive hearing loss, but no history of trauma or infection, is highly suggestive of a congenital ossicular anomaly, and stapes anomaly is

the most common among the ossicular anomalies. One case is presented of one side conductive hearing loss due to congenital stapes anomaly and no oval window on left side and the other side cochlear implantation on the opposite right side. If the patient has a hearing aid instead of a cochlear implant(CI) at the age of 2, it is believed that they can now wear a hearing aid. So, we report this case with a review of literature.

» **OTPX-17**

» A case of chloroma mimicking a retroauricular abscess

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**Da Jung JUNG, MD, PhD, Myung Hoon YOO,
MD, PhD, Kyu-Yup LEE, MD, PhD**

Acute Myelogenous Leukemia (AML) typically involves intramedullary proliferation of myeloid precursor cells. Extramedullary manifestations of AML are exceedingly rare, but do occur. Granulo-cytic sarcoma, or chloroma, is one example of extramedullary leukemia cells forming a tumorous mass. We report a case of chloroma in the mastoid presenting with unilateral facial palsy. Retroauricular abscess was at the top of the early differential, and the patient was scheduled for operative debridement and mastoidectomy. However, further evaluation indicated that chloroma was present, thus obviating the need for emergent surgical intervention and necessitating the induction of radiotherapy. To our knowledge this is rare report of chloroma in this location and with these presenting symptoms.

» **OTPX-18**

» Granulomatosis with polyangiitis with IgG4 related disease presenting as facial palsy and chronic otitis media

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**Jeon-Gang DOO, Sung-Wha DONG, Young-Min
HA, Jae-Yong BYUN, Moon-Suh PARK, Seung-
Geun YEO, Sang-Hoon KIM**

Granulomatosis with polyangiitis(GPA), Wegener's disease is an ANCA+ vasculitis, necrotizing vasculitis and granulomatous inflammation at respiratory tract. IgG4-related disease(IgG4-RD) shows lymphocytes and IgG4-secreting plasma cells infiltration. The prevalence of IgG4+ cells in GPA has not been widely reported. We introduce a case GAP with IgG4-RD. A 60-year-old female had a worsening both middle ear effusion, hearing disturbance, recurrent Lt facial palsy and numbness of bilateral lower legs. ESR, CRP, Anti-B2 GPI IgM were elevated and MPO ab and Pr III ab were at serologic tests. PTA were 35/40dB(06-15-15) and 30/CNE(11-30-15). Initial Lt facial palsy was House-Brackmann grade V. She had Lt ICW tympanomastoidectomy, Lt facial nerve decompression and ossiculoplasty with PORP(03-03-16). Biopsy of Lt nasal, middle ear cavity and septal mucosa were IgG4-RD, overlapping spectrum with ANCA+diseases like GPA. The result of kidney biopsy was GPA(Wegener's). She was treated with 8 times cyclophosphamide. Now she regularly visits on outpatient clinic. Her Lt facial palsy shows an improvement from H-B grade V to II. But her hearing of Lt ear was not restored, she had a Lt ear hearing aid.

» **OTPX-19**

» Ten years after excision of endolymphatic sac adenocarcinoma follow up of a clinical case

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Osama A. METWALY

Endolymphatic sac tumor is a rare neoplasm with benign

histopathological appearance and locally destructive behavior which usually invades the posterior petrous bone, the mastoid, semicircular canal and the cerebellopontine angle structures. This tumor has been referred to as adenocarcinoma of endolymphatic sac, papillary adenomatous tumor, aggressive papillary adenoma and papillary tumor of temporal bone. These tumors can occur sporadically or in Von Hippel-Lindau (VHL) disease. Wide excision is the treatment of choice. Based on the anatomic site, it is difficult to completely remove, and so while there is a good prognosis, recurrences or persistence may be seen. This poster presents a fifty six years old female patient with endolymphatic sac tumor which was initially diagnosed as paraganglioma, complete excision of the neoplasm was done on 2007 at Kasr Alainy Hospital, Cairo University, Egypt. Now, follow up work up for the patient was done without any detectable recurrence.

» **OTPX-20**

» Monostotic fibrous dysplasia (ossifying fibroma) of the mastoid

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**Da Jung JUNG, MD, PhD, Myung Hoon YOO,
MD, PhD, Kyu-Yup LEE, MD, PhD**

Fibrous dysplasia is a benign disease characterized by a progressive replacement of normal bone elements with fibrous tissue and the temporal bone involvement is uncommon. We presented a 24-year-old man with solitary cystic mass in his mastoid. Recently he suffered headache and visited local neurologic clinic. Brain magnetic resonance image (MRI) incidentally revealed 1.5cm – sized solitary mass located at the right mastoid. The patient wanted to remove the mass. A firm mass as a bone was completely removed under simple mastoidectomy approach. Final pathology was fibrous dysplasia. The patient is currently being followed up without any evidence

of disease recurrence.

» **OTPX-21**

» The case of giant cell reparative granuloma occurred in the temporal bone of 4 month old infant

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Yeonjoo CHOI, Jong Woo CHUNG

Giant cell reparative granuloma (GCRG) is a rare disease in the cranial bones. It is unusual benign lesion with unknown etiology but may be related to trauma. The GCRG primarily occurred at the jaw, also other craniofacial bones and short tubular bones of hands and feet. Only 13 cases of GCRG in temporal bone were reported in worldwide. Here, we report one neonatal case of GCRG occurred in the temporal bone. A 4-month-year old male born with the full term by transvaginal delivery presented with right facial palsy. He had a past medical history of right temporo-occipital craniectomy due to GCRG when he was 3-month- year old. There was no other trauma history. Magnetic resonance imaging revealed a lobulated mass in the right temporal bone, mainly petrous portion with extracranial extension through occipital bone. It was consistent with the recurrence of GCRG. The mass was removed via petroclival approach. The final pathology was a recurrent GCRG.

» **OTPX-22**

» A case of primary facial canal paraganglioma

Department of Otorhinolaryngology-Head and Neck Surgery, Hallym University College of Medicine
Jae-Moon SUNG, Dong-Hyun KIM, Hwi-Kyeong JUNG, Chang-Woo KIM

Paragangliomas of the temporal bone occur relatively

frequently and may invade the facial nerve. However, a primary paraganglioma of the facial nerve is extremely rare. Here we describe the case of a 25-year-old female patient with recurrent facial palsy. Temporal bone CT demonstrated an enlarged facial nerve canal with irregular bony erosion of the circumference. MRI showed a well enhanced heterogeneous mass. She underwent radical tumor resection and facial nerve grafting, and histopathologically confirmed paraganglioma of the facial nerve.

» **OTPX-23**

» Traumatic incus dislocation into the mastoid cavity with unilateral facial nerve palsy

Department of Otorhinolaryngology-Head and Neck Surgery, College of Medicine, Ewha Womans University

So Jeong LEE, Sung Wan BYUN, Seung-Ho SHIN, Mi Sun CHUN, Ju Yeon KIM

A 25-year-old female was referred to our otolaryngology department for evaluation of right sided facial nerve palsy (House-Brackmann grade III), and hearing difficulty. A pure tone audiogram showed mixed hearing loss (73 dB) with a 40 dB air-bone gap on the right side. A temporal bone CT showed a longitudinal fracture of the right temporal bone and incus dislocation. An exploratory tympanotomy and mastoidectomy were performed under general anesthesia. Intraoperatively, the dislocated incus body was found on the posterior wall of the mastoid cavity. The incus was repositioned, and the incudo-stapedial (I-S) joint was approximated with tissue fibrin glue. Absorbable gelatin sponges were placed around the I-S joint. Several months postoperatively, the patient's facial paralysis was normalised, and the air-bone gap was reduced to 7.5 dB. When the incus is not visible in its own location on computed tomography, this warrants a full investigation of the external auditory canal and the mastoid cavity. Tissue fibrin glue and absorbable gelatin sponges are useful for

approximating, and maximising, the stability of the I-S joint.

» **OTPX-24**

» Lateral temporal bone resection in recurred basal cell carcinoma

Department of Otorhinolaryngology-Head and Neck Surgery, The Catholic University of Korea
Jeong-Hoon OH, Su-Bin KIM

Basal cell carcinoma (BCC) is a malignancy with a good prognosis in the majority of cases. However, some BCC patients develop a more advanced disease that poses significant management challenges. Such cases include locally advanced, recurrent or metastatic BCC, or tumours that occur in anatomical sites where surgical treatment would result in significant deformity. Here we present a case of recurred basal cell carcinoma arising from the concha and external auditory canal in which the tumor was successfully removed by lateral temporal bone resection with superficial parotidectomy and auriclectomy.

RHPX

RM 1-1 (Exhibition Hall B)

Rhinology Poster Exhibition

» **RHPX-01**

» Diplopia due to sinusitis: A case report

Department of Otorhinolaryngology-Head and Neck Surgery, College of Medicine, Chonbuk National University, Jeonju, Korea
Su-Geun KIM, Eun-Ji KIM, Jong-Seung KIM, Sam-Hyun KWON

An orbital apex syndrome is a syndrome involving damage to the oculomotor nerve, trochlear nerve, abducens nerve, and ophthalmic branch of the trigeminal nerve (V1) in association with optic nerve dysfunction. Usually, visual loss and ophthalmoplegia are the initial clinical manifestations of an orbital apex syndrome. Infection, inflammation, and neoplastic conditions, and vascular causes may cause orbital apex syndrome. Recently, our hospital has encountered cases of orbital apex syndrome caused by sinusitis. A 56 year old man was admitted to our hospital's neurology department with diplopia and ptosis. MRI revealed a sinusitis in the bilateral ethmoid sinus, right frontal sinus, and left sphenoid sinus, and he was referred to our clinic. He showed trigeminal nerve palsy with limited eyeball movement at the medial gaze of the right eye. We performed bilateral Functional endoscopic sinus surgery (FESS) because we thought that sinusitis was the cause of this aspect. The diplopia symptoms improved immediately on follow-up after FESS. Thereafter, symptoms improved without recurrence. So we report this case with a review of the literature.

» **RHPX-02**

» A patient of Tolosa Hunt syndrome whose symptoms were relieved after endoscopic sinus surgery: A case report

Department of Otolaryngology-Head and Neck Surgery, Korea University College of Medicine, Ansan hospital

Mun Soo HAN, Min Kyu LEE, Seong Bin PARK, Yong Jun JEONG, Sun Jin HWANG, Min Young SEO, Tae Hoon KIM, Heung Man LEE, Sang Hag LEE, Seung Hoon LEE

Tolosa Hunt syndrome is a rare disorder presenting with unilateral headache and ocular pain, accompanied with ophthalmoplegia. A 73-year-old woman visited emergency room presenting with headache and right ocular pain. Physical examination revealed right ocular palsy in lateral

gaze. The patient was admitted to neurology department, and after MRI scan, right sphenoid sinus fungal infection was found. She was then referred to otorhinolaryngology department and underwent endoscopic sinus surgery of right sphenoid sinus. Pathology was revealed as fungal infection and the patient is visiting outpatient clinic occasionally, showing improvements in lateral gaze of right eye. We report a case of chronic fungal sinusitis presenting with symptoms of Tolosa Hunt syndrome, which were relieved after endoscopic sinus surgery.

» **RHPX-03**

» A case of huge nasolabial cyst in 55-year-old patient

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**Yong Seok JO, Hae Dong KIM, Byung Hyun
HAN, Jin KIM, Yoon Kyoung SO, Jae Keun CHO,
Jeon Mi LEE, Ick Soo CHOI**

The nasolabial cyst is a rare non-odontogenic cyst that develops within the skin adjacent to the ala of nose around the uppermost portion of the nasolabial crease. It is thought to arise from the lower anterior part of the nasolacrimal duct, either from epithelial cell rests or from the proliferation of entrapped epithelium during embryogenesis. Treatment is usually surgical resection via sublabial approach. There is rarely reported huge-nasolabial cyst, but there are no cases reported in Korea. Recently, Our department have experienced a case of huge nasolabial cyst in 55 year-old male patient. Finally, We managed this case by surgical excision was performed successfully and reported with literatures review.

» **RHPX-04**

» A case of nasal septal abscess associated with chronic Idiopathic myelofibrosis

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**Ji-Ryong KIM, Ki-Ho BAE, Jong-In JEONG,
Dong-Eun KIM**

Nasal septal abscess can result from various causes such as septal hematoma from nasal trauma or hematologic disorder, and infections of surrounding structures. Proper management of abscess requires prompt diagnosis, adequate surgical drainage, and antibiotics to prevent the potentially dangerous spread of infection and the development of severe functional and cosmetic sequelae. Chronic idiopathic Myelofibrosis, a clonal disorder of a multipotent hemtopoietic progenitor cell of unknown etiology, is characterized by bone marrow fibrosis. We had experienced a case of nasal septal abscess without antecedent trauma in chronic idiopathic myelofibrosis patient. Therefore, we present this case with a brief review of literature.

» **RHPX-05**

» A neglected nasal foreign body mistaken as a nasal mass

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Insurance Service(NHIS) Ilsan Hospital*
**Kyuin LEE, Chang Eui HONG, Jae Sung NAM,
Hyo Jin CHUNG**

A 75-year old woman presented to the Otorhinolaryngology department with a 1-year history of mucopurulent stinking nasal discharges and nasal obstruction despite the use of intravenous antibiotics for several months. She had past history of hypertension, diabetes mellitus and had been hospitalized in the long-term hospital with dementia since last year. Nasal endoscopic examination showed a brownish large firm mass covered with crust and purulent discharges at the left nasal cavity and a deviated nasal septum to the opposite side. PNS CT revealed a large mass fulfilling the cavity which resulted in the displaced nasal septum and the related sinusitis. The mass showed a cavity with air

and surrounding bone-like structures. As she was hardly cooperative for procedures due to her medical condition, she underwent endoscopic mass excision and rectangular-shaped foreign body material previously considered as the mass was removed from the cavity. Pathologic examination revealed the sponge-like fibrous material measured 2.5 cm by 2.5 cm by 0.7 cm with gram positive bacilli colonization. After the operation, she had no postoperative complications and symptoms subsided.

» **RHPX-06**

» A case of external nasal valve reconstruction on a suspicious of treacher-collins syndrome patient

*Department of Otorhinolaryngology, Chosun University
College of Medicine*

**JeongHyun OH, Ji-Hye HAN, Yoon Sik PARK,
Ji-Eun LEE, Ji-Yun CHOI**

The external nasal valve is a dynamic depression that makes nasal obstruction when the skin surrounding the underlying soft tissues undergoes depression due to insufficient bearing capacity or deficiency of the underlying skeletal structure. Therefore, improvement of the dynamic structure that strengthens the bearing capacity is the main operation goal. An 18-year-old man with no other underlying disease was referred to our hospital for alar cartilage deformity. The patient was suspicious of Treacher-Collins syndrome due to poor development of the jaw, decreased congenital visual acuity at the time of admission. The patient is very satisfied with the result. We recently successfully treated patients with nasal obstruction by external nasal valve reconstruction. In this case, an 18-year-old patient underwent external nasal valve reconstruction with a review of the literature

» **RHPX-07**

» A case of binder syndrome

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School of Medicine

Dong-Hwan OH, Dam-Ho LEE, Jae-Hoon LEE

Binder syndrome, called congenital flat nose syndrome, is a rare congenital malformation with flat facial profile, intermaxillary hypoplasia, and malocclusion. Rhinoplasty plays an important part in the multidisciplinary surgical protocol. Weak nasal framework and soft tissue underdevelopment have been considered a great challenge in Binder syndrome. We present a case of Binder syndrome of a 27-year-old male. The nose was reconstructed with caudal septum replacement graft and bilateral extended spreader grafts using costal cartilage.

» **RHPX-08**

» Nasal hump correction using modified auto-spreader graft: Report of two cases

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Bucheon Hospital, Bucheon, Korea
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It is very common to have a nose with hump, lower nasal tip and the radix among the Korean. In order to get aesthetical improvement, it is commonly performed to rasp the hump and make higher of the tip and bridge at once. As for the hump, en bloc resection is a well-known, traditional surgical method, but can cause the open roof deformity. It could be assumed the high possibility of having infection if dorsal augmentation using silicone was performed through the open roof deformity which connects with nasal cavity and dorsum. Under the assumption above, the hump on the bony portion and cartilaginous has improved by modified autospreader graft. Also, tip-plasty by dorsal augmentation using silicone, septal extension graft, strut and onlay graft could be performed with it. As a result of constant monitoring for a year, the reformation of the hump and infection was not found.

» **RHPX-09**

» Treatment of facial hypersensitivity developed after inferior meatal antrostomy

Dr Jins Premium Nose Clinic

Hong Ryul JIN, MD, Jong Sook YI, MD

A 52-year-old female complained of facial hypersensitivity and pain after left inferior meatal antrostomy, which was done to treat postoperative cheek cyst developed after Caldwell-Luc operation. After operation, she could not go outside in cold weather due to acutely developing facial and ocular pain on the left side. Symptom improved when she blocked the left nostril with cotton pledget. Endoscopic examination showed about 1.0 cm sized, patent antrostomy at the anterior part of the left inferior meatus. CT scan also showed well-formed antrostomy with poorly developed sinus with scarring of the maxillary bone. Operation obstructing more than 2/3 of the antrostomy inlet with conchal cartilage was done endonasally. She also had rhinoplasty with conchal cartilage, septal cartilage, and mastoid periosteum to augment the dorsum according to her wish. She immediately noticed improved symptom after the operation and this improvement persisted 6 months after the operation. She was also satisfied with the aesthetic result of dorsal augmentation. We believe this is the first case report of successful treatment of hypersensitive face syndrome developed after inferior meatal antrostomy.

» **RHPX-10**

» An unusual nasal polyp in an 11-year-old girl

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School of Medicine*

Dong-Hwan OH, Dam-Ho LEE, Jae-Hoon LEE

The most common site of origin of nasal polyps is the middle meatus, specifically between the uncinate process and infundibulum, and the uncinate process and middle turbinates. They sometimes originate in the infundibulum,

in the frontal recess, and sphenoethmoidal recess. Polyps protruding out of the nose are very rare because they usually remain within the nasal cavity. We describe an unusual case of polyp appearing as an extranasal polyp in an 11-year-old girl.

» **RHPX-11**

» A case of a cheek abscess and sinusitis after malarplasty

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**Hyun-Il SHIN, Dong-Hyun KIM, Eun-ju JEON, In-
chul NAM**

Reduction malarplasty for patients with a prominent malar complex is a popular procedure in Asia. However, a range of complications have been reported after reduction malarplasty, such as hematoma, orbital complications, asymmetric face, and nonunion. Fixation can be incomplete and the osteotome can penetrate the sinus during surgery, due to the narrow surgical field, which can result in sinusitis caused by a medially displaced fracture or bony fragment after malarplasty. In our case, a 21-year-old woman presented with a cheek abscess and sinusitis after malarplasty approximately one year previously.

» **RHPX-12**

» Osteoma with actinomycosis in a nasal cavity

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**Eun Ji Kim¹, Jun Sun Kim², Yeon Suk Yoo³,
Jong Seung Kim, MD, PhD**

Actinomycosis is a common disease in the oral cavity. Actinomyces is a species of bacteria that normally exists

in the oral cavity, intestines and vagina. It is a Gram-positive, anaerobic bacteria, and propagates in an anaerobic environment; it acts as a pathogen as a result of trauma. Diabetes mellitus, long-term use of steroids, nutritional deficiency or an immunosuppressed state are known to be related to actinomycosis. However, in immunocompetent patients, it is very rarely found in the nasal cavity, especially in cases with osteoma. We report a rare case of actinomycosis associated with intranasal septal osteoma in a 17-year-old female patient.

» **RHPX-13**

» A case of sinusitis showing orbital apex syndrome

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Yeon Seok YOU, Jong Seung KIM, Sam Hyun KWON

Orbital apex syndrome (OAS) is a syndrome in which there are three nerve paralysis associated with the external ocular muscles, sensory deficit in the first branch of the trigeminal nerve, and optic nerve lesions. OAS is characterized by ocular paralysis, protrusion of the eyeball, ptosis, numbness of the forehead region, and visual acuity abnormality. Causes of OAS include inflammation, infection, cancer, idiopathic, traumatic or vascular anomalies. The authors have recently encountered patients with clinical manifestations of OAS caused by sinusitis. A 58-year-old male patient with AML under chemotherapy showed headache, facial edema, ptosis, and extraocular movement limitation. PNS CT scan showed bilateral sinusitis in bilateral maxillary sinus and bilateral sphenoid sinus. After ESS, symptoms improved without recurrence. We report this case with review of literature.

» **RHPX-14**

» Primary localized amyloidosis in nasopharynx:A

case report

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Nadia Syafeera NASERRUDIN¹, Indumathi AINER¹, Kong Yew LIEW², Azlan Iskandar ISHAK², Hemlata Kumari GNANASEGARAM³

Nasopharyngeal amyloidosis is an extremely rare benign tumour. It is divided into localized or systemic amyloidosis. It is more common in men. Clinical presentation includes nasal blockage, epistaxis and reduced hearing. Classical positive Congo red stain and appearance of apple green birefringence on polarized microscopy confirms the diagnosis of amyloidosis. We present a case of nasopharyngeal amyloidosis in a 44-year old lady who presented with acute hearing loss for 1 week with epistaxis mimicking nasopharyngeal carcinoma. Clinical examination showed a nasopharyngeal mass with biopsy proven AA amyloidosis. She is now cured of amyloidosis following endoscopic transnasal excision. We discuss the similarity of presentation between nasopharyngeal carcinoma; the commonest malignant tumour in our region and the much rarer nasopharyngeal amyloidosis as well as highlighting the importance in early recognition of the latter in view of its known risk of systemic involvement.

» **RHPX-15**

» Primary nasal septal acinic cell carcinoma:A case report and literature review

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Nadia Syafeera NASERRUDIN, Syafazaima ABD WAHAB, Vijayaprakas Rao RAMANNA, Abd Razak AHMAD

Acinic cell carcinoma (ACC) is a rare malignant salivary gland tumour. It is of a low-grade type. Commonest site

is involved is at parotid gland. ACC is not common in minor salivary glands; these mainly arise in oral cavity. We presented an 84 years old Malay man with spontaneous self limiting left-sided epistaxis for 2 days. He also had progressive left-sided nasal blockage. There was no hyposmia, blur vision or headache. He has underlying hypertension. Clinical examination showed he was normotensive. There was no external nasal deformity. Anterior rhinoscopy demonstrated fungating irregular mass filling up left nasal vestibule. There was no neck node. Computed tomography showed tumour localized in nasal cavity. Biopsy showed features of acinic cell carcinoma. We proceeded with left lateral rhinotomy and wide excision. Intraoperatively, it arised from nasal septum and part of the septum has to be sacrificed for clearance of margin. Currently, he is on routine surveillance and tumour-free. We highlighted the importance in recognizing nasal acinic cell carcinoma and early biopsy is important as surgery provides a good prognosis even in the extreme age group.

» **RHPX-16**

» Congenital nasal glioma endoscopic feasibility:
A case report

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Osama HASSAN, MD

Congenital Glioma is a rarely present with intra nasal submucosal mass. Trans nasal endoscopic approach for intranasal glioma is gaining more acceptances nowadays. Our case was a 5 days old male neonate, presented with left sided huge mass on the left cheek arising from the left nostril not attached to the cheek or nasal vestibule, reddish firm with ulceration and crustation. CT scan showed left sided anterior nasal opacity filling the nasal cavity and skull base defect anterior to the axilla of middle turbinate. MRI showed hyperintense signal in T2 with areas of heterogeneous signal. The external part was separated with cauterization, then the intranasal part excised and the skull base defect reconstructed with fat from the

thigh. Difficulties: •diagnosis •separate the external mass alone,fear of CSF gush. •separate the intranasal part; adherent to the mucosa. •far anterior skull base defect. •Nasal stenosis •reconstruction with fat from the thigh, not abdominal fat conclusion; Intanasal congenital glioma is feasible endoscopically with great concern regarding proper planningand preparation of surgery.

» **RHPX-17**

» Sinonasal undifferentiated carcinoma originating
from inverted papilloma

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**Jong Hoon SONG, Eun Ji KIM, Yeon Seok YOU,
Jong Seung KIM**

Sinonasal inverted papilloma (IP) is a locally aggressive tumor found in the schneiderian membrane, lining the nasal cavity and paranasal sinuses. IP is clinically important due to its high rate of recurrence, locally aggressive nature, and association with malignancy.Synchronous or metachronous malignancy of IP usually occurs in the form of squamous cell carcinoma (SCC). Sinonasal undifferentiated carcinoma (SNUC) is nonsquamous cell epithelial and nonepithelial malignant tumor of varying histogenesis.SNUC is a high-grade malignant epithelial neoplasm with or without neuroendocrine differentiation, but without evidence of squamous or glandular differentiation. The World Health Organization classified SNUC as a highly aggressive and locally extensive tumor. SNUC arising in an IP has never been reported, until now. Here, we report a case of a 63-year-old woman with undifferentiated carcinoma (UC) arising in an IP in the left maxillary sinus with a review of literature.

» **RHPX-18**

» Sinonasal osteoblastomas in the middle

turbinate:Two case reports

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**June Sun KIM, MD, Jong Seung KIM, MD, Sam
Hyun KWON, MD, PhD**

Sinonasal osteoblastoma is a rare, benign bone-forming tumor. Osteoblastoma was first described by Jaffe and Lichtenstein in 1956.[1] This tumor accounts for <1% of all primary bone tumors and 3% of all benign bone tumors.[2] It is common in young adults, and usually involves the vertebral column and long bones. The skull and facial bones are infrequently affected. To our knowledge, paranasal involvement is extremely rare with 13 cases reported in the English language literature, whereas only 4 cases of turbinate osteoblastoma have been reported. [3] Here we report 2 rare cases with osteoblastoma in the middle turbinate in an 18-year-old woman and a 57-year-old woman. This study was approved by the institutional review board of Chonbuk National University Hospital. Informed consent was given by both patients.

» RHPX-19

» Three osteomas originating from ipsilateral separating paranasal sinuses

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Hospital*

**Dong Hoon LEE, Jae Gu KIM, Sung Min JIN,
Sung Hoon KANG, Seung Bun KIM, Tae Mi
YOON, Joon Kyoo LEE, Sang Chul LIM**

Osteoma is the most common benign tumor in the paranasal sinuses. However, multiple osteomas originating from the separating paranasal sinuses is extremely rare. We report an unusual case of a patient with three osteomas originating from the ipsilateral frontal, ethmoid, and

maxillary sinuses, which were successfully removed via endoscopic approach. Clinicians should be aware of the possibility of Gardner syndrome in patients with paranasal sinus osteomas.

» RHPX-20

» A case of subcutaneous hemangioma of the nasal dorsum with nasal cavity extension

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Neck Surgery, Ewha Womans University, School of
Medicine*

**Sojeong KIM¹, Sojeong LEE², Misun CHUN³,
Jungho BAE**

Hemangiomas are benign vascular tumors with a lobular architecture that are composed of variably-sized vessels with proliferating endothelial cells. They frequently involve the head and neck, but subcutaneous hemangioma of the nasal dorsum is a rare variant. As their size increases, they can cause functional and esthetic problems. In this report, we present the case of a young male with a nasal dorsal subcutaneous hemangioma arising from the upper lateral cartilage and extension to nasal cavity, which caused nasal deformity and obstruction. The mass was completely removed via open rhinoplasty approach. On postoperative follow up, there were no recurrent mass lesions on the nasal dorsum and the internal nasal valve was tolerably maintained.

» RHPX-21

» Typical carcinoid tumor of the sphenoid sinus involving clivus and cavernous sinus

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South Korea*

**Deok-Soo KIM, Ji-A KIM, Sung-Dong KIM, Kyu-
Sup CHO**

Carcinoid tumors are neuroendocrine tumors that are most commonly found in the gastrointestinal tracts and lungs. They seldom develop in the head and neck area as a primary tumor, and there have been rare reports of typical carcinoid tumors arising in the sinonasal area. We report a case of a 53-year-old woman with a typical carcinoid tumor arising in the sphenoid sinus with extension into posterior nasal cavity, cavernous sinus, body/greater wing/left pterygoid plate of sphenoid bone, clivus, and left occipital condyle, which was successfully treated with endoscopic sinus surgery and adjuvant radiotherapy.

» **RHPX-22**

» A case of orbital rhabdomyosarcoma in adult

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**Jungsuk KIM, Minjoon KIM, Taeyoung JUNG,
Taijung PARK**

Rhabdomyosarcoma (RMS) is a highly malignant tumor in which the tissue of origin is pluripotent mesenchyme. It is the most common soft-tissue sarcoma of the head and neck in childhood and comprises 4% of all pediatric malignancies, with 10% of all cases occurring in the orbit. Most of RMS occur in the first decade of life, however it has been reported from birth to the eighth decade. Recently we experienced a rare case of a 33-year-old man with orbital RMS, therefore we present this case with a review of literature.

» **RHPX-23**

» The three cases of nasal chondromesenchymal hamartoma occurred in sinonasal tract

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**Yeonjoo CHOI¹, Yong Ju JANG¹, Kyung-Ja
CHO², Yoo-Sam CHUNG¹**

Nasal chondromesenchymal hamartoma (NCMH) is a rare benign tumor of the sinonasal tract. Most of NCMH has benign nature, and cured by complete resection. Only a few NCMH cases were reported worldwide due to its rarity. Here, we report 3 cases of NCMH which were successfully treated, especially one diagnosed in intra-uterine period. The first case was a 1-day-old male with nasal cavity mass diagnosed in prenatal US when fetus was 28 weeks. He presented frequent desaturation event. The CT and MR showed the heterogenous solid mass causing adjacent bony remodeling without intracranial invasion. The patient underwent endoscopic sinus surgery (ESS). The second case was 10-month-old male presented nasal obstruction and strabismus. The CT and MR showed expansile soft tissue mass with indentation to orbital floor while no evidence of orbital and dural invasion. The patient underwent ESS with C-L approach. The third case was 12-year-old female presented nasal polyp. The CT finding was consistent with nasal polyp. The patient underwent ESS. All three cases revealed that all the tumors were NCMH while having benign features and are successfully treated by endoscopic approach surgery.

» **RHPX-24**

» Different characteristics of a single sinonasal inverted papilloma from sequential PET-CT: A case report

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University*

**Cha-Dong YEO, Jong-Seung KIM, Sam-Hyun
KWON**

Inverted papilloma(IP) is a well-known benign tumor of the paranasal sinus and nasal cavity. Because of the potential to become malignant, the risk of tumor recurrence, and

its local invasive nature, it is treated differently from other benign tumors such as osteoma or hemangioma. The endoscopic finding of grape clusters or hyperostosis on computed tomography(CT) is an important but not an accurate predictor of IP. Histologic examination is the only definite diagnosis of IP. Positron emission tomography(PET CT) can be a useful diagnostic tool in some studies. The most important aspect of the treatment is complete surgical resection of IP; however, it may be difficult to remove in one operation depending on its location. It is necessary to evaluate the site of origin of the tumor before surgery because it is important to plan the operation in advance to reduce the operation time and to prepare the surgical tools. In this study, we report a sequential PET CT changes in the case of a double operation in which the site of origin of the IP was difficult to access.

» **RHPX-25**

» A case of organizing hematoma in maxillary sinus

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Yong Jun JEONG, Mun Soo HAN, Kang Hyeon LIM, Kuk Jin NAM, In Sik SONG, Jae Woo JOO, Seung Hoon LEE

Sinonasal organizing hematoma is a rare, benign disease, and often confused to benign or malignant tumor. We reported a rare case of organizing hematoma. A 15-year-old male patient visited out-patient clinic presenting nasal obstruction, right facial swelling, pain. The patient denied history of recurrent epistaxis. Paranasal sinus(PNS) CT revealed 5.8cm-sized mass filling right maxillary sinus and nasal cavity. PNS MRI revealed that this mass had heterogeneous enhancement in some portion and multiple signal void in T2 phase, generally. Because of highly vascularity of this mass, we suspected that this mass was juvenile angiofibroma, rhabdomyosarcoma. Incisional

biopsy was done and the result was organizing hematoma with benign vascular proliferation. Endoscopic sinus surgery and Caldwell-Luc operation was planned, and preoperative angiography was done but feeding vessel to tumor was not visible. Operation was done as planned, and the mass was identified organizing hematoma. Organizing hematoma was often recognized by frequent epistaxis. But our patient didn't complain of epistaxis. So, it is important to diagnose and treat properly in case of organizing hematoma.

» **RHPX-26**

» A case of maxillary sinus adenocarcinoma arising from inverted papilloma

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**Shin Ae KIM¹, Yoo-Sam CHUNG¹,
Kyung Ja CHO²**

Inverted papilloma is known to have association with carcinoma, most of which are squamous cell carcinoma. It is also known to have association with adenocarcinoma, but it is extremely rare and there have been only three reported cases. Here, we present a case of adenocarcinoma arising from inverted papilloma. A 55 year old construction worker visited our clinic with chief complaint of facial swelling on the right side. He had history of endonasal endoscopic resection of inverted papilloma 3 months ago. On endoscopic examination, there were polypoid lesion in the right nasal cavity and diagnosed as recurrent inverted papilloma of right maxillary sinus. Excision via sublabial approach was planned but during the surgery, as tumor was very hypervascular and suspected as malignant, a frozen biopsy was sent and it was confirmed as adenocarcinoma. The surgery was suspended and second stage maxillectomy was planned. As the tumor involved only inferomedial side of the maxillary wall and did not involve palate area, medial maxillectomy via lateral rhinotomy approach was

performed. The permanent biopsy showed intermixed adenocarcinoma and inverted papilloma.

» **RHPX-27**

» **Resection of a septal adenoid cystic carcinoma and primary reconstruction of the surgical defect under open rhinoplasty**

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University of Ulsan College of Medicine*

Myeong Sang YU

Adenoid cystic carcinoma is one of the most common minor salivary gland malignancies of the head and neck region. However, they are rarely found in the nasal septum. The authors report a case of a septal adenoid cystic carcinoma in a 68-year-old man who complained of nasal bleeding and nasal obstruction for several months. Diagnostic nasal endoscopy revealed a protruding mass arising from anterior superior part of nasal septum. The tumor was removed under open rhinoplasty approach and performed primary reconstruction of surgical defect using septal cartilage. Histopathology indicated an adenoid cystic carcinoma with cribriform pattern. 12 months postoperatively, there was no evidence of recurrence, the functional and cosmetic results were good, and the patient was satisfied with the treatment outcome.

» **RHPX-28**

» **A case of nasopharyngeal chordoma with cystic change**

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**Hyunjung KIM, In Hak CHOI, Sang Hag LEE,
Tae Hoon KIM**

Chordomas are rare bone neoplasms that originate from remnants of notochord, often presented with cranial nerve dysfunction. The standard treatment of the tumor

is complete resection, but due to bony extension adjuvant radiotherapy is required to improve survival outcome. The author reports a rare case of chordoma with cystic change. A 37-old male presented to Thyroid Center with suspicious PTC with neck metastasis and known nasopharyngeal mass. CT revealed 2.2cm well- circumscribed cystic lesion in nasopharynx midline. Nasopharyngeal mass biopsy was planned with thyroid surgery. In the operative field, mucoid cystic mass in midline of nasopharynx was noted. The mass was taken with forcep and the pathology was consistent with chordoma. Wide excision of nasopharyngeal chordoma was planned after examining main lesion with follow- up nasopharynx CT and MRI. Using navigation system, upper, both lateral and lower margin of the remnant tumor was approximated. The antero-inferior wall of both sphenoid sinus and posterior nasopharyngeal deep muscle was removed. Permanent biopsy showed free resection margin. Adjuvant radiotherapy is planned for treatment of possible remnant tumor.

» **RHPX-29**

» **Metastatic renal cell carcinoma of maxillary sinus arised after 10 years after nephrectomy**

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**Yeon-Hee JOO¹, Sea-Yuong JEON², Sang-Wook
KIM², Hyun-Jin CHO²**

A 64-year-old man presented with left nasal obstruction lasting for 1 year. 10 years ago, he had undergone a left nephrectomy for renal cell carcinoma. In the nasal endoscopic examination, the airway was narrowed with left inferior turbinate hypertrophy and nasal septum was deviated to right side. about 2 cm round masses were observed in the right upper arm and abdomen. PNS PCT showed that a 4.6 cm maxillary sinus mass filled the left maxillary sinus and nasal cavity and the septum was displaced to

the right. PNS MRI showed delayed enhanced mass and operation was planned for biopsy and tumor resection with combined operation for the upper arm and abdomen masses. During operation, bleeding was severe and operation was stopped. Finally, metastatic clear cell renal cell carcinoma was diagnosed and the same results were confirmed in the upper arm and abdomen masses. The patient underwent angiography and embolization and reoperation to remove the intranasal mass for palliative treatment. The patient underwent pazopanib chemotherapy for treatment of systemic metastasis and there was no evidence of recurrence at endoscopy performed 6 months later.

» **RHPX-30**

» Malignant melanoma of the maxillary sinus mimicking organizing hematoma

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**Bon Min KOO, Ji Ryong KIM, Dong Eun KIM,
Jong In JEONG**

Malignant melanoma is relatively rare occurring and has more aggressive clinical course. The histological diagnosis is based on specific immunohistochemical labelling and is usually established at an advanced stage of disease. Early diagnosis of mucosal melanoma of the nasal cavity is an essential prognostic factor. We reported a case of a 55 year old woman with right facial pain and right nasal bloody discharge. By paranasal sinus CT, we supposed organizing hematoma or other neoplasm. In operation, chocolate like discharge was drained from right maxillary sinus and a biopsy was performed. The biopsy performed was diagnosed as malignant melanoma and the malignant cells were immunopositive for HMB45, S-100. As our case, malignant melanoma is difficult to diagnose as it mimics a variety of neoplasm. Therefore High index of suspicion, meticulous histopathological examination to look for melanin pigment with the appropriate immunohistochemical stains is very essential

HNPX

RM 1-1 (Exhibition Hall B)

Head & Neck Surgery Poster Exhibition

» **HNPX-01**

» Sleep apnoea as a presentation of severe laryngomalacia

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**Nadia Syafeera NASERRUDIN, Saraiza Abu
BAKAR, Khadijah Mohd NOR**

Introduction: Laryngomalacia is the commonest congenital laryngeal disease in infancy and well described cause of newborn stridor. Spectrum of disease presentation, progression, and outcomes are varied. Some infants will have persistent stridor where others develop feeding symptoms. The most fearful complication of the severe obstructive sleep apnoea (OSA) is airway obstruction as it can lead to life-threatening complication.

Case Report: We present a 6-month-old referred for noisy breathing which was noted to worsen during sleep. High pitched inspiratory stridor with deep chest recession were observed during sleep. Clinical examination showed no tonsillar hypertrophy and flexible laryngoscopy revealed features of laryngomalacia with mobile vocal folds. Overnight oximetry revealed multiple desaturation in clusters. An early direct laryngoscopy and supraglottoplasty has improved his condition tremendously. It is clearly seen during his last visit; a well thriving baby.

Conclusion: This case report discusses the importance in early detection of sleep apnoea secondary severe laryngomalacia to avoid further complication of paediatric airway.

» **HNPX-02**

» A case of protrusion of false vocal cord resulting from the deformed thyroid cartilage

Department of Otolaryngology-Head and Neck surgery, Veterans Health Service Medical Center

Sung Hwan LIM, Seung Woo KIM

Trauma, congenital malformation and aging phenomenon can be a cause of deviation in laryngeal prominence of thyroid cartilage. Among these, the senility is most common cause. Usually, ossification in thyroid cartilage is happened symmetrically, but the asymmetrical event lead to shift the laryngeal prominence. Also, such deformity can provoke protrusion of false vocal fold. A 75-year-old man with hoarseness and globus sense visited to our clinic. Five years ago, he experienced a trauma history on left midline neck and had a concave deformity in left thyroid cartilage lamina. Laryngoscopic findings revealed a marked protrusion in unilateral false vocal fold. We performed the laryngeal microsurgery to discriminate the tumorous condition. The pathology revealed non-pathologic mucosa. We report a unique and didactic case with a brief literature review.

» **HNPX-03**

» Adult cystic hygroma

Dep. of Otorhinolaryngology, Serdang Hosp.
Nadia Syafeera NASERRUDIN, Mohamad DOI

Introduction: Cystic hygroma is a congenital lymphatic malformation which predominantly affects the head and neck region. It classically presents within the first 2 years of life. It can occur de novo in adults, however its incidence is rare.

Case Report: We present a 20 years old lady with 3 months history of a spontaneous onset left neck swelling with absence of obstructive or compressive symptoms. Clinical examination revealed huge 20cm x 10cm soft mass over

the left posterior triangle extending to the supraclavicular region. Nasoendoscopy did not show any medialization of pharyngeal wall. Neck CT and FNAC supported the diagnosis of cystic hygroma with presence of multilobulated non enhancing cystic lesion seen on imaging and cytologic evidence of mature lymphocytes in a clean background, respectively. It was completely excised in toto. Follow up showed no recurrence during the first year postoperatively. **Conclusion:** Cystic hygroma is a rare cause of a neck mass in an adult. We wish to highlight the importance of recognizing cystic hygroma as possible diagnosis for an adult neck lesion and concurrently excluding malignancy via imaging and cytologic confirmation.

» **HNPX-04**

» A case of penetrating neck injury with complete spinal cord dissection

Department of Otolaryngology-Head and Neck Surgery, College of Medicine, Hanyang University, Seoul, Korea

Keon-Ho KIM, Seo-Hee WON, Chang-Myeon SONG, Kyung TAE

Penetrating neck injury(PNI) is a relatively uncommon trauma with the potential for significant morbidity and mortality. Neck contains major vessels, nerves, and trachea, so the patient with PNI must be examined promptly with emergency treatment. Especially, spinal cord injury can cause variable motor and sensory deficit with loss of sympathetic tone, which leads to neurogenic shock. We experienced a case of PNI with complete spinal cord dissection. Here we report this case with a review of the literature. A 85 years old female visited emergency room with penetrating stab injury at anterior neck. A knife was stuck on midline of anterior neck. On neck CT, it penetrated spinal cord with fracture of T1 vertebral body. Emergency operation for exploration was done under general anesthesia with ECMO insertion. After removal of 15cm knife, complete spinal cord dissection and fracture

of T1 vertebra were noted. Fortunately trachea and carotid artery were intact, and 1.0cm and 0.5cm sized esophageal laceration was sutured. After operation, the patient was on state of tetraplegia, and vital sign instability continued due to neurogenic shock and the patient expired at 17 days after surgery.

» **HNPX-05**

» A case of 72 year-old female with chondrosarcoma originated from hyoid bone

Department of Otolaryngology, Kangwon National University Hospital
Yoon-Jong RYU

Chondrosarcoma is a rare malignant tumor occurring in the trunk and long bones. Chondrosarcoma of the hyoid bone is usually low grade type, and there may be no invasion to the adjacent structures even if invasion is suspected by imaging findings. In order to preserve swallowing and laryngeal function, total hyoidectomy without laryngectomy should be indicated according to the intraoperative findings. Our case was 72 year-old female who present left SMG area mass in Outpatient clinic. We present an extremely rare case of chondrosarcoma of the hyoid bone with clinical and pathological correlation and a literature review.

» **HNPX-06**

» Pediatric follicular lymphoma in good prognosis with a watch and wait strategy after complete resection- long term follow up report

Department of Otorhinolaryngology, Head and Neck Surgery, CHA University, Bundang CHA Medical Center
So-Yoon LEE, Tae Hyun SHIN, Mi Kyung KIM, Chung Se WON

Follicular lymphoma (FL) rarely occurs in children and

adolescents. FL is recognized as a unique histopathological entity in the pediatric group, with a high proportion, having grade 3, and no BCL2-rearrangement. Moreover, while most adult patients present with disseminated disease at initial diagnosis, children usually present with localized disease confined to the peripheral lymph node only. Optical treatment of pediatric FL has not yet been defined, and therapeutic strategies differ considerably with some groups applying intensive B cell NHL-type chemotherapy and others favoring a “watch and wait” strategy after complete resection for at least BCL2-negative pediatric FL. Regardless of the type of therapy, cure rates approach 90%. A 17-year-old boy visited our hospital complaining with sub-mental neck mass. Irregular round-shaped mass was 3.5x2.5x2 cm in size with well encapsulated. Excision was performed and the result reported as pediatric FL with BCL-2 negative. There was no evidence of distant disseminated lesion. Stage I (grade 3) pediatric FL had planned to “watch and wait” strategy. We report long-term follow up result of our case with review of literatures.

» **HNPX-07**

» A case of huge retropharyngeal hematoma extending to mediastinum with tear drop fracture of C5

Department Otorhinolaryngology-Head & Neck Surgery, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea
Ho Jun LEE, Jae Ryung LEE, Yoon Se LEE, Jong-Lyel ROH, Seung-Ho CHOI, Sang Yoon KIM, Soon Yuhl NAM

Retropharyngeal hematoma is a life-threatening situation which must be immediately diagnosed, leading to a potential upper airway obstruction. An airway protection including intubation or tracheostomy may be necessary. A retropharyngeal hematoma can be formed due to a previous traumatic history, with or without associated cervical fracture. The management of traumatic retropharyngeal

hematoma is mainly conservative in most cases, with close observation. However surgical intervention is required in cases of large hematoma, being difficult with mechanical ventilation and failure to improve with medical therapy. We report a case of 75-year-old man with huge retropharyngeal hematoma extending to mediastinum with tear drop fracture of C5 after falling off the bike, which was treated with emergent decompression surgery in cooperation with neurosurgery and thoracic surgery.

» **HNPX-08**

» Salivary gland tumor with angiosarcoma and pleomorphic adenoma case report and review of literature

*Dep. of Otolaryngology, Cathay General Hospital,
Taipei, Taiwan*

Chih-Hsien LIU

Background: Angiosarcoma is an aggressive sarcoma of endothelial cell origin and rarely involves salivary glands. Coexistence of angiosarcomas and pleomorphic adenomas in a single salivary gland is extraordinarily rare and to our knowledge, has never been described previously. **Case presentation:** An 81-year-old man presented to the outpatient department with a mass that had gradually enlarged over a duration of 3 months that was located over the right submandibular region. On examination, a hard, fixed and nontender tumor was palpated. Enhanced neck computed tomography (CT) scan revealed a space-consuming lesion obliterating the right submandibular gland with heterogenous enhancement. Excision of right submandibular tumor was performed. Histopathologic analysis revealed an angiosarcoma with coexisting pleomorphic adenoma. Recurrence of angiosarcoma with distant metastases developed 3 months later. The patient expired 1 year and 4 months after receiving the diagnosis of synchronous tumors.

» **HNPX-09**

» An unusual case of fish bone migration - A case report

*Dep. of Otorhinolaryngology, Hospital Raja Permaisuri
Bainun, Ipoh, Perak, Malaysia*

**Aynesha LETCHMIKANTHAN, Lina Ling
CHOOI, Pathma LETCHUMANAN, Philip R.
DEVESAHAYAM**

Fish bone ingestion is one of the commonest reasons for a foreign body in the Asian adult population. It is known that foreign bodies do migrate and in doing so, may pass through the gastrointestinal tract uneventfully, or may end up causing bleeding, viscus perforation or even abscess collection. A 40-year-old man, presented to a private ORL specialist with dysphagia and odynophagia for 2 days. He had eaten fish the day before and had been having pricking pain in his tongue. On examination, he had no foreign body in the oral cavity. A CT scan confirmed a foreign body in the tongue. He was then referred to our center for removal. On direct laryngoscopy, no foreign body was seen intraorally. On palpating the base of tongue, a sharp protrusion was seen from the right side of the neck. A small incision was made and a 4 cm fish bone was extracted. This case illustrates that while CT scans demonstrate the area of involvement in foreign body ingestion, migration can take place. A high index of suspicion and clinical acumen are required for early and timely intervention to avoid potentially devastating complications.

» **HNPX-10**

» Synchronous benign and malignant tumors in the ipsilateral parotid gland

*Chonnam National University Medical school, Hwasun
Hospital*

**Dong Hoon LEE, Jae Gu KIM, Sung Min JIN,
Sung Hoon KANG, Seung Bun KIM, Tae Mi
YOON, Joon Kyoo LEE, Sang Chul LIM**

Synchronous benign and malignant tumors in the ipsilateral parotid gland are extremely rare. We present a rare case of pleomorphic adenoma and oncocytic carcinoma arising in the same parotid gland. Clinicians should recognize the possibility of synchronous multiple tumors in the ipsilateral parotid gland. Intraoperative careful dissection and palpation are helpful in the diagnosis of synchronous ipsilateral parotid tumors.

» **HNPX-11**

» Lingual thyroglossal duct cysts (TGDC) a case report

Department of Otolaryngology-Head and Neck Surgery, Korea University College of Medicine, Ansan hospital

**Kang-Hyeon LIM, Kuk-Jin NAM, In-Sik SONG,
Jae-Woo JOO, Kyoung-Ho OH,
Soon-Young KWON**

Lingual thyroglossal duct cysts (TGDC) are rare and account for barely 0.6– 3% of thyroglossal duct remnant diseases. In these, the cranial part of the embryologic thyroglossal duct/tract persists as a sequestered cyst with/without a variable caudal extent to the pyramidal lobe of the thyroid gland. Lingual TGDC may be incidentally detected or present with symptoms ranging from life threatening neonatal respiratory distress to a seemingly innocuous dysphonia or feeding difficulty. Yet they may miss clinical detection and diagnosis in a cursory outpatient examination. A 13-year-old female visited out-patient clinic, presenting asymptomatic bulging mass on middle base of the tongue. The mass on computed tomography (CT) was 1.8 x 2.0 x 2.7 cm sized, well defined and cystic without enhancing wall in the midline tongue base. An intra-oral excision surgery was performed and no complications occurred afterward. This report our experience with a rare case of lingual TGDC.

» **HNPX-12**

» Recurrent parotitis diagnosed as sjogrens syndrome 2 case report

Department of Otorhinolaryngology-Head and Neck Surgery, College of Medicine, Chonbuk National University, Jeonju, Korea

Su-Geun KIM, Yong-Tae HONG, Ki-Hwan HONG

Sjogren's syndrome is a complex autoimmune disease with a unique clinical phenotype and variable outcomes. It is a slowly progressive, systemic autoimmune disease characterized by chronic inflammatory infiltration of the salivary and lacrimal glands. We would like to report two cases in which a patient diagnosed as parotid abscess was later diagnosed as sjogren's syndrome. They had a history of recurrent parotitis in their both parotid gland for several years. They were all admitted to our hospital and diagnosed as parotid abscess and underwent incision and drainage. They had mild symptoms of mouth dryness and tear blistering for several years and rheumatologic blood test revealed positive for anti-SSA / Ro Ab marker. Later, parotidectomy was performed in both patients. We will discuss this case with review of literatures.

» **HNPX-13**

» A case of IgG4-Related sialadenitis mimicking salivary tumor

Department of Otorhinolaryngology-Head and Neck Surgery, Gyeongsang National University Hospital

Seong Jun WON, Seong-Chul YEO, Jinpyeong KIM, Jung Je PARK

Background: IgG4 related disease involves the major and minor salivary glands as well as the orbital region. Histology is the gold standard for the diagnosis of IgG4 related disease because the disease mimics neoplastic disorders. We report a case of IgG4-related sialadenitis mimicking salivary tumor.
Case Presentation: A 32-year-old woman presented with an

approximately 2.1cm mass in the left submandibular gland, which were preoperatively misinterpreted as pleomorphic adenoma or malignancy. After submandibular gland resection, histological result was chronic sialadenitis with fibrosis. At 14 days postoperatively, the patient complained of a submandibular mass on the opposite side. CT imaging and IgG4 immunohistochemistry was performed in previous surgical tissues. IgG4 related sialadenitis was diagnosed histologically.

Conclusions: It is necessary to consider this disease for the inflammation of the submandibular gland without accompanying sialolithiasis for accurate diagnosis.

» **HNPX-14**

» A case of parotid metastasis from sebaceous carcinoma of the eyelid

Department of Otorhinolaryngology-Head and Neck Surgery, Yonsei University Wonju College of Medicine

Hee Sung CHAE, Ha Neul LEE, Hyun Jong JEON, Ji Hoon KIM

Sebaceous carcinoma of the eyelid is a relatively rare malignant tumor. It accounts for less than 1% of all eyelid tumors, considered to be the third most common eyelid malignancy after basal cell and squamous cell carcinomas. It is characterized by high rate of local recurrence and metastasis by regional lymph node drainage. The lymph node around parotid gland has been known as a common site of regional lymph node metastasis of sebaceous carcinoma. As well as being a rare tumor, sebaceous carcinoma can mimic other benign inflammatory and malignant processes, thus errors or delays in diagnosis are not unusual. Further, in case of metastatic sebaceous carcinoma, it is much more difficult to confirm that it is metastatic carcinoma. As a result, for this reason the diagnosis will be delayed and patient's mortality rate will increase. Not only is the incidence of sebaceous carcinoma low, but parotid metastases are less common, so few cases reported so far. We present case of metastatic sebaceous

carcinoma of the parotid gland and would like to discuss what to look out for early diagnosis and the choice of appropriate treatment modalities.

» **HNPX-15**

» Fluoroscopy guided percutaneous sclerotherapy for adult facial cystic lymphangioma extending to parapharyngeal space

Department of Otorhinolaryngology, Konyang

University College of Medicine

Jong-Joong CHOI, Myung-Hee KIM, Jong-Won LEE, Hong-Keun AHN, Yeon-Soo KIM

Lymphangioma accounts for 6% of benign tumors but in adults, facial lymphangioma is very rare. Lymphangioma is benign tumor, but it is accompanied by various symptoms including pain due to compression. MRI is more useful than CT for diagnosis, and the treatment principle is total excision. However, facial lymphangiomas are more likely to spread along adjacent important structures such as carotid artery, jugular vein, and facial nerve. Recently, sclerotherapy using various materials has been used as a treatment. A 40-year-old woman visited our clinic with sudden onset facial swelling and pain. MRI showed a 20 cm sized multiseptated cystic lymphangioma with hemorrhage. For the treatment, catheter was inserted percutaneously into the face under ultrasound guidance, and then 50 cc was drained, and then 50 cc of a solution containing the contrast medium and OK-432 was slowly injected. The tumor has disappeared and has been observed without recurrence until now. We report a case of adult facial lymphangioma successfully treated with fluoroscopy-guided percutaneous catheter drainage and OK-432 sclerotherapy. Fluoroscopy can be more effective tool with sclerotherapy than ultrasound.

» **HNPX-16**

» Bronchogenic cysts treated with the transcervical approach

*Department of Otolaryngology-HNS, Research
Institute for Clinical Medicine of Chonbuk National
University- Biomedical Research Institute of Chonbuk
National University Hospital*

**Jong Hoon SONG¹, Ki Hwan HONG², Yong Tae
HONG³, Eun Ji KIM⁴, Yeon Seok YOU⁵**

Bronchogenic cysts are congenital malformations of the bronchial tree, a type of bronchopulmonary foregut malformation. The presentation of the bronchogenic cyst is variable, making pre-operative diagnosis difficult. They are mostly asymptomatic or are found incidentally when the chest is imaged. They can present as lower neck masses or mediastinal masses that may enlarge. They cause mass effect due to local compression and may result in tracheobronchial obstruction leading to air trapping and respiratory distress. The treatment is somewhat controversial, and in general, these lesions are treated using the transcervical or transbronchial approach. When these cysts are localized in the upper mediastinum, it may be possible to remove them using the transcervical approach. In our three cases, the patients complained of mild dysphagia, foreign body sensation, and dyspnea. We report three cases of a large bronchogenic cyst in the lower neck and the upper mediastinum treated using the transcervical approach.

» **HNPX-17**

» A case of double schwannomas simultaneously arising from vagus nerve and hypoglossal nerve

*Department of Otorhinolaryngology-Head and Neck
Surgery, Kangbuk Samsung Hospital, Sungkyunkwan
University School of Medicine*

**Jin LEE¹, Woo-Joo NAM², Yong-Woo LEE³,
Sang-Hyuk LEE⁴**

Schwannoma is the most common benign neurogenic tumor originating in the Schwann cells. It is usually solitary,

slow growing and encapsulated tumor. Cases of multiple schwannoma have been reported not commonly. The most common symptom is palpable indolent mass which was often accompanied by hoarseness, swallowing difficulty and headache. We can presume the nerve affected by tumor based on pre-operative and post-operative neurological deficit. The nerve of origin can be identified directly based on intra-operative findings. A 75 year old male presented with painless neck mass of left lateral side and severe headache which had been aggravated since 4 months ago. He had 2x3cm-sized oval mass on the left neck level IV, left vocal cord palsy and deviated tongue to the left on physical examination. CT and MRI findings revealed well defined mass with inhomogeneous enhancement in the left parapharyngeal space and left neck level IV area. During surgery, One mass on the left neck level IV was found to be originating from the vagal nerve, and the other mass on the left parapharyngeal space from the hypoglossal nerve. Pathologic results of both tumors were consistent with schwannoma.

» **HNPX-18**

» A case of brachial plexus schwannoma

*Department of Otorhinolaryngology Head and Neck
Surgery, Maryknoll Medical Center*

**Minjoon KIM, Seok KIM, Woongjae NOH,
Taijung PARK**

Brachial plexus schwannomas are rare tumors. They are benign nerve sheath tumors and only about 5% of Schwannoma arise from the brachial plexus. Due to its rarity and complex anatomical location they can pose a formidable challenge to surgeons. We present a case of a young patient who presented with an supraclavicular swelling three months, that were proven to be schwannoma on histopathology.

» **HNPX-19**

» Robotic nasopharyngectomy for recurrent NPC - case report

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Hee Jeong KANG¹, Dong Won LEE^{1,2}, Chang Myeon SONG¹, Kyung TAE¹

The primary treatment of NPC is RTx or CCRT. However, 15–58% of NPC patients will experience recurrence. There are several treatment options for recurred patients. Re-irradiation could result in significant radiation toxicity. Efficacy of CTx is still unclear. Biotherapy may enhance the effect of RTx. Surgical treatment can be an appropriate method for resectable rNPC avoiding complication of re-irradiation. However, due to difficult access, various surgical approaches had been developed including maxillary swing, facial translocation approach, transnasal endoscopic resection and robotic approach. Endoscopic or robotic approaches can be used for resection of small, centrally located recurrent tumors with minimal morbidity. Especially, Transoral robotic procedure seems to be better. We recently experienced a case of robotic nasopharyngectomy for rNPC. 52 year female patient with NPC visited clinics due to recurrence. She underwent RTx 1 year ago, and small recurrence occurred in left Resenmuller fossa. Transoral robotic nasopharyngectomy with palatal flap was performed, and complete gross tumor resection was possible. Here, we report this case with the literature review.

» **HNPX-20**

» Pedunculated fibrolipoma of the hypopharynx - A case report

Department of Otorhinolaryngology-Head and Neck

Surgery¹, Pathology², National Health Insurance

Service Ilsan Hospital

Chang Eui HONG¹, Kyuin LEE¹, Jeong Hae KIE², Hyang Ae SHIN¹

Fibrolipomas are a rare microscopic variant of lipomas, which are characterized by mature adipose tissue interspersed by dense fibrous connective tissue. They are rarely located in the head and neck and represent less than 0.6% of the benign tumors of the larynx and hypopharynx. Their clinical presentation depends on its location and size. The symptoms are variable, but it has clinical importance when fibrolipoma does occur in the larynx and hypopharynx, for they can cause unpredictable airway obstruction, particularly during the induction of general anesthesia. We presented a case of a hypopharyngeal fibrolipoma in 61-year-old patients with frequent dyspnea, dysphagia and muffled voice. Laryngoscopy revealed a well-demarcated ovoid mass occupying the larynx and presenting a pedunculated appearance. Surgical excision was performed under laryngomicrosurgery with CO2 laser and subsequently confirmed as fibrolipoma. We report this case with a review of the literatures.

» **HNPX-21**

» A case of thyroid hyalinizing trabecular tumor mistaken for papillary carcinoma in aspiration cytology

Department of Otolaryngology-Head and Neck Surgery¹ and Pathology², Veterans Health Service

Medical Center

Seok Jung HONG¹, Eun Ju KIM², Seung Woo KIM¹

Hyalinizing trabecular tumor (HTT) in thyroid gland is a rare neoplasm and only less than 100 cases have been reported so far. It is characterized by hyalinizing stroma with trabecular growth pattern and has an indolent clinical course. Because of its histologic features, it is frequently

misdiagnosed as papillary or medullary carcinoma in fine needle aspiration cytologic (FNAC) findings. The tumor is benign or low malignant potential and thyroid lobectomy is recommended for the adequate treatment. We recently experienced a case of thyroidal HTT in a 57-year-old man, who presented with right thyroid nodule that was suspicious of papillary carcinoma in FNAC. We report the unique and rare disease entity with brief literature review.

» **HNPX-22**

» **Thyroid paraganglioma coexisting with papillary thyroid cancer**

Department of Otorhinolaryngology-Head and Neck Surgery, College of Medicine, Chonbuk National University, Jeonju, Korea

**Eun Ji KIM¹, Su Geun KIM², Jong Hoon SONG³,
Yong Tae HONG, MD, PhD,
Ki Hwan HONG, MD, PhD**

Thyroid paraganglioma is a rare tumor, and this disease usually present as a solid hypoechoic nodule in computed tomography(CT) and ultrasonography, which has no significant differences from other thyroid neoplasm. The present study reports a rare case of thyroid paraganglioma coexistent with thyroid papillary carcinoma. A 60-year-old female visited our hospital complaining of her throat discomfort for 1 month ago. Pre-operative radiological studies showed a papillary carcinoma on left thyroid gland. Further Left thyroid lobectomy was performed and thyroid paraganglioma was finally diagnosed by histologic assesment and immunohistochemical staining. The current study presents a case of thyroid paraganglioma coexistent with papillary carcinoma and discusses the clinical features and histological characteristics.

» **HNPX-23**

» **Cowden syndrome presented as multiple thyroid follicular carcinoma a case report**

Department of Otorhinolaryngology-Head and Neck Surgery, College of Medicine, Chonbuk National University

**Cha-Dong YEO, Yong-Tae HONG,
Ki-Hwan HONG**

Cowden syndrome(CS) is an infrequent autosomal dominant multisystem genodermatosis, generally involving the skin, oral mucosa, thyroid, breast and gastrointestinal tract. It is characterized by a late onset in the 2nd or 3rd decade of life, an extraordinary potential for malignant transformation, especially of breast and thyroid, and an identifiable germline mutation. In 80% cases, the human tumor suppressor gene, phosphatase and tension homolog(PTEN) is mutated. Its clinical signs are not only the “essential pearls” for early and accurate diagnosis of Cowden syndrome but also help timely detection of neoplasia as they precede development of cancer by several years. We describe the case of a 36-years-old female patient with a past medical history of endometrial hyperplasia diagnosed as multiple thyroid follicular carcinoma in both thyroid gland. We emphasize the importance of early detection and accurate management of Cowden syndrome.

» **HNPX-24**

» **Papillary thyroid microcarcinoma presenting as Horner's syndrome and vocal cord palsy**

Department of Otolaryngology, College of Medicine, Inha University, Incheon, Korea
Sung-Hoon KIM, Ji-Won KIM

Papillary thyroid microcarcinoma (PTMC) is commonly localized, and slow growing. However, it sometimes metastasizes, especially to neck lymph nodes. Here we present a rare case of PTMC presenting Horner's syndrome and vocal cord palsy. A 58 year-old female presented with left cervical lymphadenopathy, voice change and left ptosis and anhidrosis for 3 months. On thyroid CT, a 0.8cm sized dense calcification in left thyroid gland was identified.

It is highly suspicious of papillary thyroid cancer. A 5.6cm sized irregular contoured enhancing mass with necrosis and calcification in left level II and III, with encasement of left common carotid artery (CCA) and internal carotid artery (ICA). She underwent total thyroidectomy with selective neck dissection (II-V), central neck dissection. A 5.6cm sized mass on CCA and carotid bifurcation was identified and resected without carotid injury. Left vagus nerve was also invaded and we identified inflamed nerve, which causes voice change. All the grossly observed masses without complication. Patient underwent I-131 radioablation therapy and her symptoms of vocal cord palsy and Horner's syndrome were still remained with disease free state.

» **HNPX-25**

» **Huge follicular thyroid carcinoma mimicking as thyroid goiter**

Department of Otorhinolaryngology-Head and Neck Surgery, College of Medicine, Chonbuk National University, Jeonju, Korea

**Yeon Seok YOU¹, Yong Tae HONG²,
Ki Hwan HONG³**

An 82 year-old woman visited our out-patient clinic due to a huge thyroid mass. The mass had grown over the past 30 years, and was about 15 x 15cm in size. For further evaluation, a neck Computed tomograph(CT) and ultrasonography(US) was taken and a huge mass was seen in the right thyroid lobe. The mass had grown to a size that was causing tracheal deviation. In the past, she had diagnosed as thyroid goiter based on her Chest CT, thyroid scan, thyroid US, and thyroid Fine needle aspiration(FNA) in other hospital. A thyroid FNA performed before surgical incision also showed nodular hyperplasia. Finally she received thyroidectomy and diagnosed as huge follicular thyroid carcinoma. So here we report a case of huge follicular thyroid carcinoma mimicking as thyroid goiter with review of literatures.

» **HNPX-26**

» **The case of thyroiditis derived from lingual tonsillitis**

Department of otorhinolaryngology-Head and Neck surgery, Dongguk University College of medicine, Ilsan Hospital

**Jung-Woo SHIN, Bo-Hae KIM, Sang-Woo KIM,
Yun-Sung LIM**

Thyroiditis and lingual tonsillitis is very common disease. Many clinician make a diagnosis and prescribe medicines for each diseases, respectively. However, We can't find any research about the relationship between those two diseases or cases about thyroiditis which was derived from lingual tonsillitis. A 50-year-old female patient visited our clinic with complaints of tongue base discomforts which progressed downward to anterior neck and feels like there is a band retracting the tongue base to downward. On physical examination, there was diffuse thyroid hypertrophy and tenderness. Endoscopic exam showed a localized swollen tissue in left lingual tonsil. There was a mild leukocytosis. Fine needle aspiration under ultrasonography revealed that irregular and indistinct hypoechoic lesion that proved to be a benign follicular nodule with some lymphocyte infiltration. We make a diagnosis of thyroiditis derived from focalized lingual tonsillitis based on relationship between symptoms of thyroid area and lingual tonsil swelling which is suspicious of thyroglossal duct tract So, the authors present an interesting and rare case of thyroiditis arising from lingual tonsillitis.

Instruction Course

April 29 (Sun)

[IC 8]	08:30-09:10 RM 2-5 (Crane)
Subtle glottic insufficiency and diagnostic vocal fold augmentation	
<i>Thomas L. CARROLL (Brigham and Women's Hosp. USA)</i>	

[IC 9]	09:30-10:10 RM 2-5 (Crane)
BAHA: The importance of using super power instruments in BAHs patients	
<i>Jaime MARCO (Univ. of Valencia, Spain)</i>	

[IC 10]	10:40-11:20 RM 2-5 (Crane)
Basic principles of laryngo-microsurgery	
<i>Han Su KIM (Ewha Womans Univ.)</i>	

[IC 11]	11:40-12:20 RM 2-5 (Crane)
Dysphagia in head and neck cancer therapy	
<i>Young Hak PARK (The Catholic Univ. of Korea)</i>	

[IC 12]	13:30-14:10 RM 2-5 (Crane)
Surgical technique for cochlear implantation from basic to advanced	
<i>Jun Ho LEE (Seoul National Univ.)</i>	

[IC 13]	14:20-14:50 RM 2-5 (Crane)
Retrosigmoid approach for acoustic tumor removal surgical landmarks and tips	
<i>Ki-Hong CHANG, Beom-Cho JUN (The Catholic Univ. of Korea)</i>	

[IC 14]	15:20-16:00 RM 2-5 (Crane)
Easy and safe fiberoptic laryngeal laser surgery (FLS) under local anesthesia	
<i>SeungWon LEE (Soonchunhyang Univ.)</i>	

[IC 15]	16:10-16:40 RM 2-5 (Crane)
Beginning and setting up transoral endoscopic thyroid surgery from A to Z	
<i>Jun-Ook PARK (Inje Univ.)</i>	

IC 8

RM 2-5 (Crane)

» 08:30-09:10

» Subtle glottic insufficiency and diagnostic vocal fold augmentation

Brigham and Women's Hosp.

Thomas L. CARROLL

Glottic insufficiency (GI) is the inappropriate escape of air from the glottis during phonation. GI can be gross as seen in the setting of vocal fold paralysis or significant atrophy. GI can also be subtle, as seen in vocal fold paresis, atrophy and scar. The treatment for gross GI is often clear and medialization procedures are offered. Patients with subtle GI often have less severe complaints but can be significantly impacted by the compensatory laryngeal behaviors seen in cases of GI. Muscle tension dysphonia is often secondary to cases of subtle GI and the underlying cause for the hyperfunctional behaviors needs to be diagnosed accurately to afford appropriate treatment. This course will cover how to diagnose subtle glottic insufficiency through laryngovideostroboscopic clues, interpretation techniques including frame-by frame analysis, and the use of diagnostic vocal fold augmentation (DVFI). Per-oral, office based vocal fold injection technique for DVFI will be reviewed as will the technique for fat graft augmentation in the operating room that is intended for permanent effect. The use of DVFI in cases of GI and other conditions, essential tremor, chronic cough and Parkinson's disease specifically, will be discussed.

IC 9

RM 2-5 (Crane)

» 09:30-10:10

» BAHA: The importance of using super power instruments in BAHS patients

Univ. of Valencia, Spain

Jaime MARCO

Bone anchored hearing aids have been a revolution in the treatment of conductive hearing loss. Due to the efficacy of the devices the indication has expanded through the recent years reaching mixed hearing losses with the bone threshold at higher levels.

I present in this congress the primary results achieved with the Ponto 3 Superpower processor in cases with air thresholds in the moderate to severe degrees.

6 patients have been implanted with the Ponto 3 Superpower device and followed up from 3 to six months- No surgical complications neither postoperative infections or extrusions have been detected.

All patients closed the gap between air and bone thresholds. Patients underwent pure tone audiometry, without Ponto processor, softband with power 3 and power 3 superpower processors.

Postoperative pure tone audiometry with sound coming from 0°, speech audiometry with dysyllabic Word list at 65 & 80 dB. Finally speech audiometry with background noise; HINTS 65 dB; foxed noise at 65 dB +/- 2 dB Speech signal

All patients underwent Glasgow Benefit Inventory and the Abbreviated Profile of Hearing Aid Benefit, pre and postoperation.

The auditory tests showed the closure of the gap and a very good result of speech in noise and subjective tests showed a clear benefit.

Key words: Mixed hearing loss, Ponto 3 Superpower. results

IC 10

RM 2-5 (Crane)

» 10:40-11:20

» Basic principles of laryngo-microsurgery

Ewha Womans Univ.

Han Su KIM

Laryngo-microsurgery (LMS) encompasses a variety of operation that is performed with Laryngo-microsurgery equipment under microscope vision. There are precise operations that involve microsurgical removal of benign vocal fold pathologies (polyp, cyst) and even pre- and malignant lesions in the larynx. The context of this instruction courses are, 1) Micro-surgical equipment of LMS, 2) Pitfalls of anesthesia, 3) Position of patient and placement of laryngoscope, 4) Understanding of manipulation of CO2 laser, 5) Basic operative procedures of benign vocal fold lesions. This instruction course will be consist of many movie clips and pictures, therefore the beginner and residents could get useful information about LMS.

IC 11

RM 2-5 (Crane)

» 11:40-12:20

» Dysphagia in head and neck cancer therapy

The Catholic Univ. of Korea

Young Hak PARK

Dysphagia is a common problem for the patients presenting with tumors of the oral cavity, pharynx, or larynx. Dysphagia may result from tumor infiltration or obstruction and from surgical removal of the tumor,

radiotherapy, chemotherapy, or a combination of these procedures. Each type of cancer treatment may result in some degree of dysphagia. The type and severity of dysphagia depends on the size and location of the original tumor, the structures involved, and the treatment modality used for cure. Surgical removal of tumors of the head and neck is a well-established treatment modality that is still in wide use today. Swallow dysfunction is often observed after surgical excision of tumors in the head and neck; swallow disorders may occur in the oral preparatory, oral and pharyngeal stages of the swallow. Swallowing problems after surgery for head and neck cancer depend on the site and stage of the tumor, the extent of surgical resection, and the nature of the surgical reconstruction. Postoperative radiotherapy has an additional negative impact on swallowing function by increasing fibrosis of the irradiated head and neck tissues. The use of radiotherapy with or without chemotherapy for treatment of cancer of the head and neck as a primary treatment modality has increased over the past 20 years. Despite preservation of the structures of the head and neck, swallow function is not maintained at normal levels after treatment. Dysfunction is observed across all stages of the swallow in most tumor sites treated with standard external-beam radiation. Attempts have been made to minimize the amount of damage to normal tissues and reduce the adverse effects of treatment on swallowing function by reducing radiation dose to swallow-critical structures. Patients who have cancers of the head and neck may be treated with surgery, radiotherapy, chemotherapy, or a combination. Each treatment modality may have a negative impact on posttreatment swallowing function. The clinician has a number of rehabilitative procedures available to reduce or eliminate swallowing disorders in patients treated for cancer of the head and neck. After diagnosing the swallowing disorder, the clinician can use postures, maneuvers, and exercises to treat the swallow disorder and to help the patient achieve optimal function. The efficacy of various treatment procedures for dysphagia still needs to be examined in carefully controlled randomized clinical trials. Although a very frustrating and common problem,

dysphagia in the head and neck cancer patient can be reduced through reconstructive efforts and swallowing rehabilitation.

Keywords: Dysphagia, Head and neck cancer

IC 12

RM 2-5 (Crane)

» 13:30-14:10

» Surgical technique for cochlear implantation from basic to advanced

Seoul National Univ.

Jun Ho LEE

To accomplish the successful and safe cochlear implantation (CI), obtaining the knowledge about surgical anatomy and surgical skill is needed. During all of the procedures in CI, we have to know about how to perform the procedure and what is the precaution to avoid making complication and to improve CI outcome. In this session, the author will inform surgical tips. Surgeons inevitably encounter unusual cases such as anatomic variation, inner ear anomaly, CHARGE syndrome, revision cases, and NF-II. The author will introduce difficult or extraordinary cases and inform you the treatment strategies and surgical skill for successful and safe surgery in those cases.

IC 13

RM 2-5 (Crane)

» 14:20-14:50

» Retrosigmoid approach for acoustic tumor removal surgical landmarks and tips

The Catholic Univ. of Korea

Ki-Hong CHANG, Beom-Cho JUN

There are three options in the treatment of acoustic tumor; wait & scan, microsurgical removal, and stereotactic radiation therapy. Among them, microsurgical removal is the basis of the acoustic tumor treatment. Translabyrinthine approach, middle fossa approach, and suboccipital retrosigmoid approach are the main surgical modality. Translabyrinthine approach and middle fossa approach are usually used by otologists. Retrosigmoid approach, however, is used by neurosurgeons in practice. Though co-work between otologist and neurosurgeon is very important, it is essential to have enough understanding of all three surgical approaches to take the initiative in choosing a surgical approach as an ENT doctor. ENT doctors who majored in otology are very familiar with temporal bone pathology of chronic otitis media and with handling of microinstrument. Therefore, otologist can carry out retrosigmoid approach without big problem. In this instruction course we are going to understand an anatomical landmark related to the intracranial posterior fossa and to find out advantages and disadvantages of retrosigmoid approach with clinical data of acoustic tumor.

IC 14

RM 2-5 (Crane)

» 15:20-16:00

» Easy and safe fiberoptic laryngeal laser surgery (FLS) under local anesthesia

Soonchunhyang Univ.

SeungWon LEE

Objective: Otolaryngology residents, clinical fellows, and junior laryngology staff.

Purpose: The role of fiberoptic laryngeal laser surgery (FLS) in laryngology has been significantly expanded with recent

developments in medical technology and the introduction of various types of laser. FLS is typically performed under local anesthesia, and patients may return to normal activities immediately after the procedure. This corresponds to the current trend toward minimally invasive surgery and may limit general anesthesia, reduce medical costs, and increase patient compliance. However, there is a lack of opportunity to learn about FLS procedures, complications, and management. In this instructional course, the author will discuss how to select good candidates for FLS and predict the results. The second author will discuss how to easily anesthetize patients, including approaches such as premeditation and topical anesthesia. Finally, we will provide practical tips, discuss difficulties in miscellaneous FLS, and demonstrate how to perform each procedure.

Contents: 1. Patient selection. 2. Safety of commercially available fiberoptic CO₂, holmium, and potassium titanyl phosphate (KTP) lasers. 3. Local anesthesia and patient monitoring. 4. Fiberoptic laryngeal surgery for benign vocal fold lesions, vocal fold papilloma, and granuloma under local anesthesia. 5. Extended fiberoptic laryngeal surgery for vocal fold leukoplakia, glottic web, glottic dysplasia, and airway stenosis. 6. Related complications and management.

about preoperative preparations, patient selection, surgical procedures, and postoperative management. I will also review the trial and error that I have experienced for two years and how we can reduce complications and shorten the running curve. 1. Introduction: why is it needed. 2. Setting instruments and operating room. 3. Anesthetic consideration (to prevent CO₂ embolism). 4. Patient Selection (for the 1st case). 5. Surgical procedures (creation of working space, right and left thyroid lobectomy, removal of specimen, dressing). 6. Postoperative management. 7. Trial and errors, Postoperative complication.

IC 15

RM 2-5 (Crane)

» 16:10-16:40

» Beginning and setting up transoral endoscopic thyroid surgery from A to Z

Inje Univ.

Jun-Ook PARK

Transoral endoscopic thyroid surgery is a safe alternative to open surgery for some patients and it has been used increasingly by several surgeons around the world for the past two years. For beginners who want to set up transoral endoscopic thyroid surgery, I would like to talk

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2	Advanced Bionics
3	Ahn-Gook Pharmaceutical
4	AJU PHARM
5	ALPINION MEDICAL
6	Alvogen korea
7	Arlico Pharm
8	ART MEDITECH
9	Bioimplant Technology
10	Bite Communications (BMW)
11	BUKWANG PHARM
12	CACTUS Communications
13	Carl Zeiss
14	CHAMMED
15	CKD Pharm
16	cpap Korea
17	Crystal Optic
18	Daewon pharm
19	DAEWOONG PHARMACEUTICAL
20	DAEYOU MEDICAL
21	DAONE MEDICAL
22	DASAN AR Lab.
23	Dmed
24	DONGJIN INTL., MB TRADING
25	DONGKOO BIO&PHARMA
26	DongKook pharmaceutical
27	Dongsung Pharma
28	FNDNET
29	For You
30	GENORAY
31	GlaxoSmithKline Korea
32	HANLIM PHARM
33	Hanmi medicare
34	Hanmi Pharm
35	HanWha Pharma
36	HDX WILL
37	Hearing Medics
38	HearLife
39	HYUNDAI PHARM
40	ILDONG PHARMACEUTICAL
41	Ilung PHARMACEUTICAL

42	JEIL PHARMACEUTICAL
43	JOONGANG MEDICS
44	KOLMAR KOREA
45	KOLON
46	KOREA UNITED PHARM
47	KUHNIL PHARM
48	Kwangwoo Healthcare
49	LEICA KOREA
50	Lumenis Korea
51	MD PHARM
52	Medical Devices Intl.
53	MEDSTAR
54	Mega Medical
55	MSD
56	OLYMPUS KOREA
57	OTICON KOREA
58	P&C Surgitec
59	POINTNIX
60	Ray medical
61	ResMEd KOREA
62	SAMAPHARM
63	SEASUN BIOMATERIALS
64	Sejong Medical
65	Seoul pharma
66	SHINHAN LIFE INSURANCE
67	SLMED
68	Sometech
69	SONOVA
70	STARKEY KOREA
71	T&R Biofab
72	Thermo Fisher SCIENTIFIC
73	U-MEDICAL
74	UNIPHARM KOREA
75	Univan
76	WIDEX KOREA
77	Woori Wow
78	YNC SOLUTION
79	YOOYOUNG PHARMACEUTICAL
80	YUHAN CORPORATION
81	Yuyu Pharma