WELCOME MESSAGE

Dear Colleagues,

I would like to express great gratitude for holding the 13th Annual Meeting of the East Asian Conference on Phonosurgery (EACP 2023) in Sendai City. The meeting and exhibition will be held from the evening of July 7th to the end of the day on July 8th, at Koyo Grand Hotel, Sendai, Japan.

In Japan, COVID-19 restrictions have been relaxed since May this year, and face-to-face academic conferences and social gatherings are finally free to be held. Under such circumstances, despite the urgent call for abstracts, a total of 60 abstracts were registered, including 6 special lectures, 34 oral presentations, and 26 posters. We would like to express our sincere gratitude to all of you for your kind cooperation.

In the history of EACP, otolaryngologist, speech language pathologist, and various staffs in health-science field have been studied and communicated together in the conference. Please share the novel knowledges of phonosurgery and foster friendly relations

Sendai, the host city, is touted as the city of trees, and is a calm small regional city surrounded by greenery in summer. Before and after the meeting, we hope that you will enjoy the popular atmosphere of the Japan, such as exploring the izakaya and gala dinner with shamisen performances, and use it as an opportunity to interact.

Thank you for your participation to EACP 2023.
I hope your visit will be a fruitful experience.

Best regards,

7th July, 2023

Yukio Katori

President of the 13th East Asian Conference on Phonosurgery (EACP)

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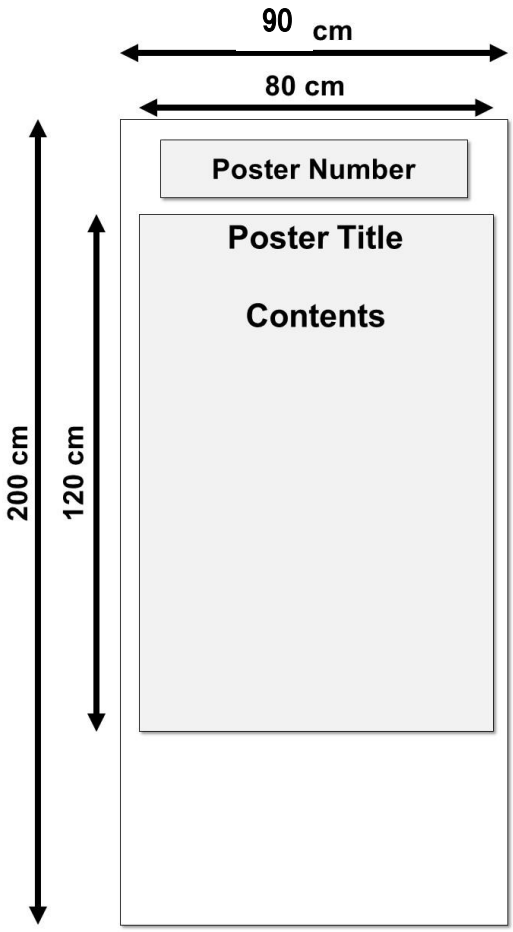
1. Presentation Preview
   - Presentation Preview is imperative for every presenter.
   - Please check-in your data to the preview desk at least 30 minutes prior to the beginning of your session.
   - Please bring USB with the data or your own laptops for the presentation.
   - Technical supports will assist you for any questions or concerns for your presentation.

     *If your presentation data contains Video, we strongly suggest to bring your own laptop to avoid any trouble.

[Preview Room]	**Opening Time**	**8:00 – 15:00**
	Location	**5F, west end (alongside Room-1)**

2. Presentation Timing
   - Time for special lecture is 40 minutes (35 minutes for presentation and 5 minutes for Q and A.
   - Time for oral session is 10 minutes (7 minutes for presentation and 3 minutes for Q and A).
   - A few paper (changed from symposium) are for 15 minutes (12 minutes for presentation and 3 mintues for Q and A).
   - Presentation data is only available in Microsoft Powerpoint version 2013 or later.
   - In each session, moderators keep program on time.
   - The session moderator will facilitate the discussion.
   -
3. Presentation
   - Please arrive the conference room at least 10 minutes prior to the beginning of your session.
   - Presenter will operate their own slides during the presentation. On the other hands, the technical support is available at each conference room.
   - During your presentation, slow and clear talk is recommended.
   - Presenter, or one of co-authors are required to present during the session.

Guidelines to help your oral presentation



- Each poster author will be provided with an approx. 2000mm (high) and 900mm (width) board area, as shown in the following drawing. Thus, actual poster size with 1200mm (high) and 800mm (width) is preferable.
- All illustrations, charts, etc,, to be posted should be prepared by yourself in advance. Support concerning poster editing will not be available during the Conference.
- Pushpins are available close to the poster board.
- Poster text must be edited in a large enough front to be viewer friendly.
- Poster authors are responsible for setting up and removing their own posters in the following specific time.
- Poster authors have a presentation time from 15:30 to 17:30 as the following. Moderators will guide the tour of viewer and manage presentation (6 minutes each) and Q & A (2 minutes each).
- All posters should be removed during 17:30 – 18:00.

[Poster] **Setting and View** **9:00 – 15:30**

Location **5F, south and east**

Presentation **15:30 – 17:30**

Moderator will manage “tour” alongside each row

Poster Session 1 (P1 – P13)

Poster Session 2 (P14 – P27)

Presentation time: 6 minute, Q~A: 2 minute.

Schedule

7th July (Friday)

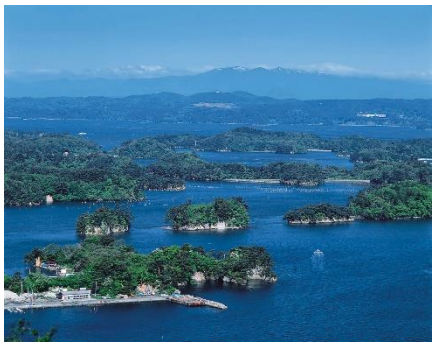
17:00 - 19:00	Registration and Welcome Drink (KOYO GRAND HOTEL 4F)
19:00 -	Short Tour to Japanese Pub “Izakaya” (Free Charge)

8th July (Saturday)

8:50	Opening Remarks (KOYO GRAND HOTEL 5F)
9:00 -12:00	Scientific Session Special Lecture and Oral Presentation
12:00 - 13:00	Lunch (Room 1, 5F)
13:00 - 15:45	Scientific Session Special Lecture and Oral Presentation
15:30 - 17:30	Poster Presentation
18:00 - 20:00	Gala Dinner

Board Member Business Meeting
8th July 12:00 – 13:00 (4F)

Tour for Accompany Persons
8th July 9:00 – 14:00
Matsushima, Pine-Island
Zuigannji Temple
Lunch
(Free Charge)



13th East Asian Conference on Phonosurgery

8th July, 2023 KOYO GRAND HOTEL, Sendai, Japan

Room 1 (Houou West, 5F)	Room 2 (Houou East, 5F)	Poster Sace (5F)
Opening Remark 8:50-9:00		
Special Lecture -1 9:00 -9:40 Hirotaka Hara (Kawasaki Medical School)		
Oral Session -1 9:40 -10:15 Basic Research O-1 ～ O-3	Oral Session -2 9:00 -10:00 Voice Evaluation O-4 ～ O-9	
Special Lecture -2 10:15 -10:55 Li-Chun Hsieh (Mackay Memorial Hospital)	Oral Session -3 10:00 -10:30 Framework Surgery O-10 ～ O-12	
	Oral Session -4 10:30 -11:15 Nerve Reconstruction O-13 ～ O-16	
Special Lecture -3 11:20 -12:00 Song Young -Ik (Sungkyoukwan University)	Oral Session -5 11:25 -12:00 Vocal Fold Injection 1 O-17 ～ O-19	
Lunch 12:00 -13:00		Poster Attachment and Viewing 9:00 -15:30
Special Lecture -4 13:00 -13:40 Yung-An Tsou (China Medical University Hospital)	Oral Session -6 13:00 -14:10 Voice Restoration, Imaging Study O-20 ～ O-25	
Special Lecture -5 13:40 -14:20 Seoug-Won Lee (SoonChunHyang University Hospital)		
	Oral Session -7 14:10 -15:10 Vocal Fold Injection 2 O-26 ～ O-30	
Special Lecture -6 14:40 -15:20 Koichiro Saito (Kyorin University)	Oral Session -8 15:10 – 16:10 Surgery and Technique O-31 ～ O-35	
		Poster Presentation 15:30 -17:30
		Remove
Gala Dinner 18:00 -20:00		

EACP 2023 The 13th East Asian Conference on Phonosurgery Contents

【Special Lectures】

Special Lecture 1 **Room-1 9:00 – 9:40**

Chair: Chen-Chi Wang
(Taichung Veterans General Hospital, Taichung)

Feasibility of Coblation Surgery under Videolaryngoscopy in Laryngeal Lesions

Hirotaka Hara (Kawasaki Medical School, Okayama, Japan)

Special Lecture 2 **Room-1 10:30 – 11:10**

Chair: Tack-Kyun KWON (Seoul National University)

Management of Unilateral Vocal Fold Paralysis

Li-Chun Hsieh (Mackay Memorial Hopital, Taipei, Taiwan)

Special Lecture 3 **Room-1 11:10 – 11:50**

Chair: Akihiko Shiotani (National Defense Medical College)

Injection Laryngoplasty in Patients with Unilateral Vocal Fold Paralysis; A Review of the Author's 20-Year Experiences.

Young-Ik Son (Sungkyoukwan University, Seoul, Korea)

Special Lecture 4 **Room-1 13:00 – 13:40**

Chair: Hirohito Umeno (Kurume University)

Injection Laryngoplasty for Glottic insufficiency: General Outcomes and Subgroup analysis

Yung-An Tsou (China Medical Universtiy Hospital, Taichung, Taiwan)

Special Lecture 5 **Room-1 13:40 – 14:20**

Chair: Tuan-Jen Fang (Chang Gung Memorial Hospital)

Is the 532nm laser treatment effective for vocal fold scar and sulcus vocalis ?

Seung-Won Lee (SoonChunHyang University Hospital, Bucheon, Korea)

Special Lecture 6 **Room-1 14:40 – 15:20**

Chair: Seung-Ho Choi (Ulsan University)

Less Invasive Office-based Management of Diseased Voice

Koichiro Saito (Kyorin University, Tokyo, Japan)

【Oral Sessions】

Oral Session 1 Basic Research ***Room-1*** **9:40 – 10:15**

Chair: Koichi Omori (Kyoto University)

O-1 Phonosurgical Histoanatomy of the Maculae Flavae of the Vocal Folds

Kiminori Sato (Kurume Univeresity, Kurume, Japan)

O-2 Expression of Muscle Genes in Vocal Fold Lamina Propria of Aging Rat.

Byung-Joo Lee (Pusan National University, Busan, Korea)

O-3 Clinical and Cellular Experience of Patients with Vocal Nodules Treated with Traditional Chinese Medicine

Cheng-Ming Hsu (Chang Gung Memorial Hospital, Chiayi, Taiwan)

Oral Session 2 Voice Evaluation ***Room-2*** **9:00 – 10:00**

Chair: Masamitsu Hyodo (Kochi University)

Tzer-Zen Hwang (E-Da Hospital, Kaohsiung)

O-4 Estimating the Minimal Important Difference of Acoustic Voice Quality Index in Treatment of Voice Disorders: Correlating with Auditory-Perceptual and Patient-Reported Anchors

Kiyohito Hosokawa (Osaka University, Osaka, Japan)

O-5 The Predictors of Speech Proficiency Among Laryngectomees with ALT Phonatory Tube Reconstruction

Li-Jen Hsin (Chang Gung Memorial Hospital, Taoyuan, Taiwan)

O-6 Acoustic Analysis of Postoperative Speech Impairment in Oral Cancer Surgery

Yutaro Saito (Tohoku University, Sendai, Japan)

O-7 Artificial intelligence application as prognosis evaluation tool after the treatment for voice disorder

Hao-Chun Hu (Fu Jen Catholic University Hospital, New Taipei, Taiwan)

O-8 Improving the Accuracy of the GRBAS Scale App under the Influence of Noise

Tsuyoshi Kojima (Kyoto University, Kyoto, Japan)

O-9 Withdrawn

Oral Session 3 Framework Surgery ***Room-2*** **10:00 – 10:30**

Chair: Byung-Joo Lee (Pusan National University)
Kenichi Watanabe (Tohoku Rosai Hospital)

O-10 Laryngeal Framework Surgery Using an Ultrasonic Device: Management of Ossified Thyroid Cartilage

Shunichi Chitose (Kurume University, Kurume, Japan)

O-11 Preliminary Experience with a 3-Dimensional Exoscope-Assisted Laryngoplasty

Tetsuji Sanuki (Nagoya City University, Nagoya, Japan)

O-12 Endoscopic Arytenoid Reduction under Local Anesthesia for Suspected Arytenoid Dislocation

Chang Hwan Ryu (National Cancer Center, Goyang, Korea)

Oral Session 4 Nerve Reconstruction ***Room-2*** **10:30 – 11:15**

Chair: Chi-Te Wang (Far Eastern Memorial Hospital)
Niro Tayama (National Center for Grobal Health and Medicine)

O-13 Ten-year outcomes of recurrent laryngeal nerve reinnervation for thyroidectomy-related unilateral vocal fold paralysis: A single-surgeon, prospective study

Seung-Won Lee (SoonChunHyang University Hospital, Bucheon, Korea)

O-14 Recurrent Laryngeal Nerve Reconstruction for Secure Vocal Paralytic Related Dyspnea and Dysphonia

Pei-Shao Liao (China Medical University, Taichung, Taiwan)

O-15 Time-dependent Changes of Vocal Function by Age Groups Following Laryngeal Reinnervation Combined with Arytenoid Adduction

Kohei Nishimoto (Kumamoto University, Kumamoto, Japan)

O-16 Effect of Aging on Vocal Outcomes after Laryngeal Reinnervation Combined with Arytenoid Adduction

Eiji Yumoto (Asahino Hospital, Kumamoto, Japan)

Oral Session 5 Vocal Fold Injection (1) ***Room-2*** **11:25 – 12:00**

Chair: Koichiro Saito (Kyorin University)

O-17 Treatment Outcomes of Intralesional Steroid Injection for Refractory Vocal Process Granuloma

Chi-Te Wang (Far Eastern Memorial Hospital, Taipei, Taiwan)

O-18 Local Steroid Injection for Benign Vocal Fold Lesions: Age-Dependent Therapeutic Effect

Kazutaka Kashima (Jichi Medical University, Saitama, Japan)

O-19 Effects of Early Local Administration of High-dose bFGF on a Recurrent Laryngeal Nerve Injury Model

Takao Goto (Tokyo University, Tokyo, Japan)

Oral Session 6 Voice Restoration, Imaging Study ***Room-2*** **13:00 – 14:10**

Chair: Li-Chun Hseih (Mackay Memorial Hopital)
Yoshihiko Kumai (Nagasaki University)

O-20 Comprehensive Evaluation of Vocal Outcomes and Quality of Life After Total Laryngectomy and Voice Restoration with J-Flap and Tracheoesophageal Puncture.

Wanni Lin (Chung Gung Memorial Hospitail, Linkou Medical Center, Taoyuan, Taiwan)

O-21 A Case in which Dynamic Analysis by Multi-row CT was Useful in Determining the Treatment Strategy for Tracheal Stenosis

Daisuke Inukai (Aichi Medical University, Aichi, Japan)

O-22 Ultrasound imaging of the cricoarytenoid joint

Chikako Kunieda (Hashima City Hospital, Hashima, Japan)

O-23 Anatomical Features of Recurrent Laryngeal Nerve Paralysis Cases Due to Aortic Aneurysm Using Three-dimensional Computed Tomography Imaging

Jumpei Sasakawa (Tokyo Metropolitan Children's Medical Hospital, Tokyo, Japan)

O-24 Pathophysiological Mechanisms Underlying Unilateral Vocal Fold Paralysis: An Ultrasonographic Study

Yi-An Lu (Chang Gung Memorial Hospital at Linkou, Taoyuan, Taiwan)

O-25 Modified Killian's Method for Flexible Nasopharyngoscopic Observation of the Hypopharynx: A systematic Review and Meta-analysis

Yi-Chan Lee (Chang Gung Memorial Hospital, Taoyuan, Taiwan)

Oral Session 7 Vocal Fold Injection (2) ***Room-2*** **14:10 – 15:10**

Chair: Sung-Min Jin (Sungkyunkwan University, Kangbuk Samsung Hospital)

Yusuke Watanabe (International University of Health and welfare)

O-26 Laryngeal Electromyography Guided Hyaluronic Acid Injection Laryngoplasty for Unilateral Vocal Fold Paralysis

Chen-Chi Wang (Taichung Veterans General Hospital, Taichung, Taiwan)

O-27 Prolonged Effects of Hyaluronate Injection in Adolescent Unilateral Vocal Fold Paralysis

Tuan-Jen Fang (Linkou Chang Gung Memorial Hospital, Chang Gung University, Taoyuan, Taiwan)

O-28 Application of Artificial Intelligence-Based Ultrasonic Image Analysis in Patients Receiving Injection Laryngoplasty for Unilateral Vocal Paralysis

Wen-Hsuan Tseng (National Taiwan University Hospital, Zhubei, Taiwan)

O-29 Transoral videolayngoscopic vocal fold medialization with calcium phosphate cement for unilateral vocal cord palsy – Experience of original technique

Masahiko Seki (National Defense Medical College, Saitama, Japan)

Oral Session 8 Surgery and Technique ***Room-2*** **15:10 – 16:10**

Chair: Tetsuji Sanuki (Nagoya City University)

Young Hak Park (The Catholic University of Korea)

O-30 Real-Time Light-Guided Vocal Fold Injection via the Cricothyroid Membrane in Unilateral Vocal Fold Paralysis: A Human Pilot Study

Wonjae Cha（Seoul National University Bundange Hospital, Seoul, Korea）

O-31 Endoscopic Thyroarytenoid Myoneurectomy in Patients with Adductor Spasmodic Dysphonia

Han Su Kim (Ewha Womans University, Seoul, Korea)

O-32 Two Cases of Laryngeal Stenosis Treated with Endoscopic Wedge Excision

Tsunehiro Oka (Kurume University, Kurume, Japan)

O-33 Nonintubated General Anesthesia with High-flow Nasal Oxygenation for Laryngeal Surgery: A Case Series

Ting-Shou Chang (Kaohsiung Veterans General Hospital, Kaohsiung, Taiwan)

O-34 Salvage Transoral Laser Microsurgery for Recurrent Glottic Cancers

Chun-Ting Lu (New Taipei Municipal Tucheng Hospital, New Taipei, Taiwan)

O-35 The Novel 445-nm Blue Laser in Laryngeal Surgery: from Basic to Clinical Applications

Ying-Ta Lai (Shuang Ho Hospital- Taipei Medical University, New Taipei, Taiwan)

【Poster Sessions】

Poster Area (5F) **Set and View 9:00 – 15:30**
Presentation 15:30 – 17:30

Poster Session 1

Chair: Shigeyuki Murono (Fukushima Prefecture Medical University)
Rumi Ueha (Tokyo University)
Kiminori Sato (Kurume University)
Takeharui Kanazawa (Jichi Medical University)

P-1 Vocal Fold Immobility after the First Dose of the Oxford-AstraZeneca COVID-19 Vaccine with Recovery: A Case Report and a Systemic Review

Yi-Chieh Lee (New Taipei Municipal Tucheng Hospital, New Taipei, Taiwan)

P-2 Management of Bilateral Vocal Fold Paralysis with Laterofixation

Ryota Yuasa (Asahikawa Medical University, Asahikawa, Japan)

P-3 Endoscopic Partial Arytenoidectomy for Bilateral Vocal Fold Paralysis

Shinsuke Suzuki (Akita University, Akita, Japan)

P-4 Two Cases of Bilateral Recurrent Nerve Palsy Treated with Arytenoidectomy

Osamu Kawakami (Kanazawa Medical University, Kahoku, Ishikawa)

P-5 Treatment of Unilateral Vocal Fold Paralysis by Laryngoplasty

Kazuya Kurakami (Yamagata University, Yamagata, Japan)

P-6 Long-term Voice Outcomes after Arytenoid Adduction Surgery

Kenichi Watanabe (Tohoku Rosai Hospital, Sendai, Japan)

P-7 Postoperative Outcomes of Autologous Fat Injection Laryngoplasty in Unilateral Vocal Cord Paralysis

Kohei Hagiwara (Kitasato University, Tokyo, Japan)

P-8 Fibroblast Growth Factor Injection for Unilateral Vocal Fold Paralysis: Long-term Results and Safety

Tomohiko Yamauchi (Jichi Medical University, Shimotsuke, Japan)

P-9 Changes in Serum Basic Fibroblast Growth Factor Concentration Following Intracordal Injection

Tomohiro Hasegawa (International University of Health and Welfare, Tokyo, Japan)

P-10 Clinical Usefulness of Korean Items for the Differential Diagnosis of Adductor Spasmodic Dysphonia

Jae-Seon Park (Sungkyunkwan University, Seoul, Korea)

P-11 Botulinum Toxin Injection by Thyrohyoid Approach Using a Double-bent 60mm Cathelin Needle for Adductor Spasmodic Dysphonia

Hironori Baba (Niigata University, Niigata, Japan)

P-12 Randomized, Double-blinded Clinical Trial of BotulinumTtoxin Therapy for Spasmodic Dysphonia in Japan

Suguru Maeda (Kochi University, Nankoku, Japan)

P-13 Evaluation of the Therapeutic Effects of Botulinum Toxin Injection According to the Diagnostic Criteria and Severity Classification of Spasmodic Dysphonia

Masaki Hatano (International University of Health and welfare, Tokyo, Japan)

Poster Session 2

Chair: Yasushi Fujimoto (Aich Medical University)
Takaharu Nito (National Center for Grobal Health and Medicine)
Shinsuke Suzuki (Akita University)
Shunichi Chitose (Kurume University)

P-14 Withdrawn

P-15 Clinical Experiences of Tracheoesophageal Puncture with Voice Prostheis in Single Medical Facility

Chien-Jen Chiu (China medical university hospital, Taichung, Taiwan)

P-16 A Case of Difficult-to-treat Hoarseness after Laryngeal Trauma

Sumie Takashima (Nagasaki University, Nagasaki, Japan)

P-17 Surgical Management for Obsolete Cricoid Fracture Following Blunt Trauma

Yosuke Nakanishi (Kanazawa University, Kahoku, Ishikawa)

P-18 Two Cases of Arytenoid Dislocation; Different Treatment Approaches

Naoki Takemoto (Nagoya City University, Nagoya, Japan)

P-19 A Case Report of Traumatic Dislocation of the Cricothyroid Joint Successfully Treated with Laryngeal Chondroplasty Type IV

Yoshihiro Iwata (Fujita Health University, Toyoake, Japan)

P-20 A Case of Recurrent Laryngeal Granuloma Treated with Intralesional Steroid Injection.

Ai Hirano (Tohoku University, Sendai, Japan)

P-21 Office Based Fiberscopy May Overlook the Neonatal Dysphonia

Chia-Der Lin (China Medical University & Hospital, Taichung, Taiwan)

P-22 Analysis of Speech Fundamental Frequencies for Different Tasks in Japanese

Taisuke Sotome (Jichi Medical University, Shimotsuke, Japan)

P-23 Effectiveness of Voice Therapy in Patients with Mutational Falsetto

Wei-Qian Qiu (Taichung Veterans General Hospital, Taichung, Taiwan)

P-24 Effects of Laryngeal Massage on Voice Recovery after Thyroid Surgery

Ji Won Kim (Inha University College of Medicine, Incheon, Korea)

P-25 The Classification of Laryngeal Benign Disease by Analyzing Continuous Speech Using Artificial Intelligence

Young Ju Jin (Kangwon National University, Chuncheon, Korea)

P-26 Recognizing Edge-Based Diseases of Vocal Cords by Using Convolutional Neural Networks

Pei-Ju Chiu (China medical university hospital, Taichung, Taiwan)

P-27 Respiratory Epithelial Regeneration through Stepwise Differentiation of Human Tonsil-Derived Mesenchymal Stem Cells

Soo Yeon Jung (Ewha Womans University, Seoul, Korea)

Special Lecture 1

Feasibility of Coblation Surgery under Videolaryngoscopy in Laryngeal Lesions

Hirotaka Hara*, Hiroaki Tadokoro, Yuichiro Maeda, Masakazu Hamamoto, Yujiro Fukuda, Sho Kinoshita.

**Dept. of Otolaryngology-Head and Neck Surgery, Kawasaki Medical School, Okayama, Japan.*

We have been performing endoscopic laryngeal microsurgery under general anesthesia for over 20 years. In all cases, endoscopic laryngeal microsurgery has been successfully performed. In particular, with the use of a high-definition monitor system, surgery of vocal fold mid membranous lesions (polyps, nodules, cysts) has been performed easily and safely under the video-laryngoscope.

The development of medical engineering has been remarkable in recent years. The power devices have been developed and used in the fields of otorhinolaryngology-head and neck surgery. Among them, coblation surgery has been widely used in the pharyngeal region, but it can also be applied to the laryngeal region. By using the Wands for laryngeal microsurgery, removal of laryngeal papillomas and arytenoid cartilage evaporation for bilateral vocal cord paralysis can be performed more effectively. In this presentation, we will demonstrate the usefulness of coblation surgery in laryngeal microsurgery and demonstrate the actual procedure.

Key words

Coblation, Video-laryngoscope, laryngomicrosurgery, papillomas, bilateral vocal cord paralysis

Special Lecture 2

Management of Unilateral Vocal Fold Paralysis

Li-Chun Hsieh*

**Dept. of Otolaryngology Head and Neck Surgery, Mackay Memorial Hopital, Taipei, Taiwan.*

Unilateral vocal fold paralysis (UVFP) is a common disorder caused by recurrent laryngeal nerve injury, which may be either iatrogenic, idiopathic, or due to other intrinsic/extrinsic causes. After RLN damage, UVFP may result in different degrees of incomplete glottal closure with symptoms including voice-, breathing- and swallowing- impairment.

Voice assessments, including perceptual analysis, acoustic-, and aerodynamic-measurements, and self-rating questionnaires, are necessary before and after any treatment to support the best clinical care and outcome. In acute and intermediate phases of UVFP, voice therapy, injection laryngoplasty with resorbable fillers are the preferred therapy modalities to improve the impaired voice, breathing and/or swallowing functions. In the chronic phase of UVFP, injection laryngoplasty with non-resorbable materials, thyroplasty type I, laryngeal reinnervation, and botulinum neurotoxin injection in synkinesis should be considered in UVFP management.

Thyroplasty type I has been widely accepted as the standard phono-surgical procedure in UVFP patients, because of its long-lasting effect and demonstrable improvement in vocal performance. Despite the widespread use, the revision rate ranges 8–33%, including improper implant size, persistent posterior glottal gap, implant migration, and postoperative vocal quality deterioration due to laryngeal muscle atrophy. The three key important things about any implant to be inserted into the larynx are “compatibility”, “adjustability” and “reversibility”. An ideal and safe laryngeal implant should therefore be made of inert materials, conformable to anatomical and changing clinical conditions at any time and the procedure easily reversible. The adjustability is especially helpful to intraoperatively conform the implant dimension to laryngeal variations, whereas postoperative adjustment enables implant adaptation to progressively changing conditions in post-thyroplasty larynges.

Special Lecture 3

Injection Laryngoplasty in Patients with Unilateral Vocal Fold Paralysis; A Review of the Author's 20-Year Experiences.

Young-Ik Son*

Department of Otorhinolaryngology - Head & Neck Surgery, Sungkyunkwan University School of Medicine, Samsung Medical Center, Seoul, Korea.

Unilateral vocal fold paralysis (UVFP) is a condition characterized by the immobility of one vocal fold, leading to dysphonia, breathiness, effortful phonation, and potential airway compromise, significantly impacting the patient's quality of life. UVFP can occur due to various etiologies, including iatrogenic injury during surgery, trauma, viral infections, and idiopathic causes.

Injection laryngoplasty (IL) has emerged as an effective treatment option for UVFP. It involves the injection of biomaterials or bulking agents into the paralyzed vocal fold to improve vocal fold position and restore glottal closure. This procedure aims to enhance vocal quality, reduce aspiration risk, and alleviate respiratory symptoms. Numerous biomaterials have been used for injection laryngoplasty, including hyaluronic acid, calcium hydroxylapatite, polymethyl methacrylate, autologous fat, and collagen-based substances. These materials provide temporary or long-lasting augmentation, depending on their properties.

In general, injection material is selected in consideration of the duration of paralysis and the possibility of recovery. The choice between temporary and long-lasting materials for IL in potentially recoverable UVFP patients remains a topic of debate. Temporary materials allow for ongoing assessment of vocal fold recovery, as they do not interfere with the natural healing process. Conversely, long-lasting materials provide immediate and sustained vocal fold augmentation, potentially avoiding the need for repeated procedures. Our study indicated that the permanent infection material did not adversely affect the natural recovery. (3)

The timing for IL must be determined by the patient's situation; in the cases of patients with high vocal demand or with dysphonia or aspiration that interfere with daily life, it is desirable to perform IL as soon as possible regardless of the possibility of recovery. Several authors reported that early IL reduced the need for later framework surgery and had the advantage of better voice quality. We also reported that early IL is a safe and efficient treatment strategy in patients with UVFP after thyroidectomy. (4)

Understanding the prognostic factors for effective voice rehabilitation in patients with UVFP undergoing IL is essential for individualizing treatment approaches and optimizing outcomes. Various factors may influence the success of voice rehabilitation following IL in patients with UVFP. These factors include age, gender, overall health status, and underlying etiology of UVFP. Laryngoscopic findings, such as the degree of vocal fold bowing, position, and glottal gap, provide important insights

into the severity of vocal fold immobility. Our study indicated that old age, large posterior glottal gap, and poor pulmonary function are the major poor prognostic indicators. (5) (6) Identification of these factors can aid in patient selection, treatment planning, and counseling regarding expected outcomes. In cases where there is insufficient voice rehabilitation following IL in UVFP, several additional phonosurgical procedures can be considered to further optimize voice outcomes. Our study suggests that repeated injection laryngoplasty can lead to additional improvement in vocal function and voice quality in patients with UVFP. (7) We also reported the voice outcomes of sequentially performed IL and arytenoid adduction. These combined procedures have been associated with increased glottal closure, improved phonatory parameters, and reduced aspiration risk, regardless of the order of the procedure. (8)

A comprehensive approach to IL involves personalized treatment plans tailored to each patient's specific needs. Factors such as the duration of vocal cord immobility, degree of vocal cord bowing, presence of comorbidities, and individual patient expectations should be considered in the treatment decision-making process. Additionally, a multidisciplinary approach involving laryngologists, speech-language pathologists, and voice therapists is essential to maximize functional outcomes and ensure long-term success.

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Special Lecture 4

Injection Laryngoplasty for Glottic insufficiency: General Outcomes and Subgroup analysis

Yung-An Tsou*

**Dept. of Otorhinolaryngology (ENT), Head and Neck Surgery, China Medical Universtiy Hospital, Taichung, Taiwan.*

Glottic insufficiency includes unilateral vocal palsy (UVFP), vocal atrophy, vocal sulcus, and vocal scars which affect the voice function and could be treated by various materials to achieve improved mucosal wave and better closure during phonation. Injection laryngoplasty is considered an exemplary method for these patients and could be a safe conservative therapy for patients with dysphonia. In this report, we first presented autologous fat injection for iatrogenic-related vocal palsy focusing on thyroid-related surgery and sharing the outcomes in our cohort by subgrouping them by gender, body mass index (BMI), and age. Second, we just presented our study on the voice outcomes of current fat injection laryngoplasty for patients with UVFP. Finally, we presented our experience of platelet-rich plasma (PRP) injection laryngoplasty for patients with UVFP. Our findings were that gender and age may stand as significant categories for clinical voice prognostic indicators in UVFP patients. We also found improvements in shimmer after surgery and a six-month follow-up for autologous fat injection laryngoplasty (AFIL). A few complications after AFIL were noted in patients with UVFP. The combination of AFIL plus PRP is useful for treating vocal sulcus, and is a safe treatment.

Special Lecture 5

Is the 532nm laser treatment effective for vocal fold scar and sulcus vocalis ?

Seung-Won Lee*

**Dept. of Otolaryngology-Head and Neck Surgery, Soonchunhyang University College of Medicine, Bucheon, Korea.*

Vocal fold scar is an intractable disease that results from the destruction of the multilayered collagen structure, with unclear definitive treatments. Surgical treatment of the scar, such as scar excision or autologous fat, collagen, or steroid injection, has been attempted with limited success.

According to the author's rabbit vocal fold scar model experiments, a 532-nm diode laser glottoplasty was associated with significant improvement in vocal fold vibration, accompanied by an increase in the mRNA levels of MMP-2, MMP-9, HAS-2, and HAS-3, and reduced mRNA levels of procollagen I, TGF-ß1, and IL-6 compared to the control group. In addition, 532-nm diode laser glottoplasty has a regenerative effect on the vocal folds by improving wound remodeling, and may also decrease fibrogenesis and collagenesis in a rabbit model.

Furthermore, numerous conventional surgical modalities have been introduced to treat sulcus vocalis, such as slicing technique, fascia implantation, and sulcus dissection; however, these modalities are technically difficult to perform and reliant on surgical skill and experience, which makes it difficult to obtain stable surgical results.

In contrast to these other surgical modalities, 532-nm diode laser glottoplasty is a much simpler technique and produces more stable results, as shown in our study. Because this technique can therefore be performed more rapidly and easily than the other surgical modalities, it offers a significant advantage.

Considering the lower incidence of serious complications and ease of use, 532-nm diode glottoplasty may be a useful alternative treatment modality for patients with sulcus vocalis, which is currently an intractable vocal fold disease. The author plans to provide further analysis of the 532-nm laser and its treatment mechanisms with regards to sulcus vocalis in upcoming EACP special lecture.

Key words: Scar, Regeneration, Laser, Vocal fold

Special Lecture 6
Less Invasive Office-based Management of Diseased Voice

Koichiro Saito*
**Kyorin University Faculty of Medicine, department of Otolaryngology-HNS, Tokyo, Japan.*

It has been over 15 years since paradigm shift in the management of VF diseases from OR to Office was advocated. Voice therapy (VT) is now the first-choice therapeutic strategy against most of diseases which induce hoarseness. Furthermore, target pathologies of VF injection and laser surgery are expanding. We have proved the therapeutic impact of VT against presbyphonia. Moreover, VT showed satisfactory therapeutic outcome against VF nodules even in the cases with long-time diseased period before VT application. As for phonosurgery, even during the COVID disaster which forced people to stay home, and to avoid social activities, increasing number of office-based surgery was observed in our institution. Especially, green laser surgery (GLS) against RRP, as well as vocal fold steroid injection (VFSI) against inflammatory diseases have been showing excellent therapeutic outcomes. We recently started to apply subepithelial injection of basic fibroblast growth factor (bFGF) against glottal insufficiency, and has been showing promising results so far. In this lecture, therapeutic outcome of office-based management, including VT, GLS, VFSI, and bFGF injection, against diseased voice in our institution are shown. Our experience-based realistic tips concerning office-based surgical approach would be provided, and should be some clinical helps for attendees of this session.

O-1

Phonosurgical Histoanatomy of the Maculae Flavae of the Vocal Folds

Kiminori Sato*, Taikai Kuroiwa, Tsunehiro Oka, Fumihiko Sato, Kiminobu Sato, Takeharu Ono, Shun-Ichi Chitose, Hirohito Umeno

**Dept. of Otolaryngology, Head and Neck Surgery, Kurume Univeresity School of Medicine, Kurume, Japan.*

Background

There is growing evidence that the cells in the maculae flavae (MFe) located at both ends of the lamina propria of the vocal fold mucosa are tissue stem cells and the MFe are a stem cell niche. Tissue stem cells in the MFe are likely involved in the metabolism of extracellular matrices, which are essential for the viscoelastic properties of the vocal fold mucosa, and are responsible for maintaining the characteristic layered structure of the human vocal fold mucosa as a vibrating tissue. In addition, MFe are likely involved in wound healing. The present study investigated the phonosurgical histoanatomy of the anterior and posterior MFe and their surrounding tissues.

Methods

Clinically, five total laryngectomy cases were observed. Histoanatomically, six normal human adult vocal folds were investigated using the whole-organ serial section technique.

Results

Clinically, the anterior and posterior MFe were observed at each end of the membranous portion of the vocal fold under surgical microscope. They formed conspicuous mucosal bulges and they were relatively firm and visible through the mucosa as whitish-yellow masses. After making an incision in the mucosa, the MFe and continuing vocal ligament could be detected as white tissues under surgical microscope. Histologically, the MFe were dense masses of cells and extracellular matrices. The membranous portion of the vocal fold was firmly connected to the thyroid cartilage anteriorly via the intervening anterior MF and anterior commissure tendon. Posteriorly, the membranous portion of the vocal fold joined to the vocal process of the arytenoid cartilage via the intervening posterior MF. The transition of cells and extracellular matrices between the posterior MF and elastic cartilage portion of the vocal process was gradual and the border between them was not clearly delineated. The vocal ligament ran between the anterior and posterior MFe.

Conclusion

Since the anterior and posterior MFe can be detected under surgical microscope, MFe (stem cell niches) should be preserved as far as possible during phonosurgery. If we could artificially manipulate tissue stem cells and their microenvironment in the stem cell niche (MFe) under surgical microscope, the tools for future therapeutic approaches could be provided.

O-2

Expression of Muscle Genes in Vocal Fold Lamina Propria of Aging Rat

Byung-Joo Lee*, Ji Min Kim, Young-il Cheon, Jin-Choon Lee, Eui-Suk Sung, Minhyung Lee

**Dept. of Otorhinolaryngology-Head and Neck Surgery, College of Medicine, Pusan National University and Biomedical Research, Busan, Korea.*

Vocal fold fibroblast plays an important role in the production of extracellular matrix of vocal folds. The purpose of this study was to analyze the changes and functions of muscles genes related to myofibroblast differentiation in aging vocal folds through next generation sequencing (NGS) analysis.

Young (6-months old) and old (22-months old) male Sprague-Dawley rats were used for this study. NGS data were analyzed by the functional annotation using gene ontology and network analysis method. After identification of increased expression of muscle genes, the functions of muscle genes on fibroblast senescence and proliferation ability, myofibroblast differentiation and contraction ability were investigated.

Among the four muscle genes obtained through network cluster analysis of NGS results, the expression of Mylk2 and Myom2 were significantly increased in lamina propria of old rats compared to young rats. The increases of Mylk2 and Myom2 genes were associated with replicative senescence, myofibroblast differentiation, and the contractile ability of myofibroblast.

Mylk2 and Myom2 are striated skeletal muscle genes that increase in the aging rat vocal fold lamina propria. These genes were associated with fibroblast to myofibroblast differentiation. Our results suggest that Mylk2 and Myom2 are novel biomarkers of the vocal fold myofibroblast in aging rat.

O-3

Clinical and Cellular Experience of Patients with Vocal Nodules Treated with Traditional Chinese Medicine

Cheng-Ming Hsu*

**Dept. of Otolaryngology, Chang Gung Memorial Hospital, Chiayi, Taiwan.*

Purpose

Vocal fold nodules (VFNs) are the most frequent cause of hoarseness. The management comprised medical, surgical and physical therapy but the effectiveness is not always satisfactory. Treatment is usually based on silence or speech therapy. If conservative treatment fails, surgical resection of the nodule should be considered. However, such patients usually have occupations that require long-term use of the vocal cords, such as teachers, singers, etc., and voice suppression therapy is not feasible; and speech therapy has problems in terms of time and distance, and drug treatment is almost ineffective. It is more invasive and carries the risk of postoperative vocal cord damage. In this study, we try to figure out an alternative treatment from our clinical experience and cellular evidence.

Material and Methods

We retrospectively reviewed VFNs patients who received traditional Chinese medicine (TCM) treatments from July 2018 to August 2020 and traced their Chinese Voice Handicap Index-10 (VHI-C10) and multidimensional voice program (MDVP) analysis results. For further evaluation, we conducted an inflammatory response of porcine vocal fold epithelial (PVFE) cells with 50 ng/mL TNF-alpha. The inflamed PVFE cells were separately cultured in the aqueous extract of Glycyrrhiza glabra (G. glabra) and Platycodon grandifloras (P. grandifloras).

Results

In these VFNs patients (n = 22), the average VHI-C10 score decreased from 17.6 to 6.6 ($p < 0.001$). MDVP analysis revealed improvements in jitter, shimmer, noise–harmonic ratio, and GRBAS scoring system. Of the TCM prescription patterns, G. glabra and P. grandiflorus were used most frequently. In the MTT assay of PVFE cells, no adverse effects of our extracts were observed at doses of 1–200 μg/mL. Western blot analysis revealed downregulation of p65 and mitogen activated protein kinase pathway proteins.

Conclusion

The results from both the clinical and in vitro aspects of this study revealed that the herbs G. glabra and P. grandiflorus may offer beneficial outcomes as alternative treatments for VFNs after precise diagnosis. Traditional Chinese medicine may be a non-invasive treatment option for vocal cord nodules.

O-4

Estimating the Minimal Important Difference of Acoustic Voice Quality Index in Treatment of Voice Disorders: Correlating with Auditory-Perceptual and Patient-Reported Anchors

Kiyohito Hosokawa*, Toshihiko Iwahashi, Mio Iwahashi, Shinobu Iwaki, Misao Yoshida, Itsuki Kitayama, Masayuki Nozawa, Makoto Ogawa, Hidenori Inohara

**Dept. of Otorhinolaryngology-Head and Neck Surgery, Osaka University Graduate School of Medicine, Osaka, Japan.*

Introduction

The Acoustic Voice Quality Index (AVQI) is a reliable tool that objectively assesses hoarseness levels using six acoustic parameters. Despite its high criterion-related concurrent validity and diagnostic accuracy, the minimal important difference (MID) of AVQI, representing a meaningful improvement perceivable by either clinicians or patients, remains unclear. This study aims to estimate the MIDs of AVQI for both clinicians and patients.

Methods

A retrospective study was conducted on 110 patients who underwent treatments for voice disorders. Patients completed AVQI and VHI-10 questionnaires before and after therapy. The MIDs of AVQI were estimated using the anchor of either auditory-perceptual judgment of hoarseness levels (G-score) by clinicians or the VHI-10 questionnaire by patients. A distribution-based approach was also used to complement the results.

Results

Firstly, using the auditory-perceptual anchor, a decrease of 0.954 in AVQI was estimated as the MID for clinicians, as a result of the receiver operating curve (ROC). Next, using the patient-reported anchor, an improvement of 1.36 in AVQI was estimated as the MID for patients. In the distribution-based approach, the change in AVQI (ΔAVQI) range of 95% confidence intervals of 1.10 or 1.19 ensured the validity of the clinicians' or patients' anchor-based results, respectively. Furthermore, ΔAVQI showed a high correlation with the changes in G-score, which showed that a 0.5 change in G-score corresponded with a 0.952 change in AVQI.

Conclusions

The AVQI provides a reliable and valid tool for evaluating voice quality, and a change of 1.0 in AVQI represents a meaningful improvement for clinicians, while an improvement of 1.3 in AVQI influences patients' perception. Our study contributes to understanding the minimal amount of change necessary for clinicians to make informed decisions and ensure patient satisfaction.

O-5

The Predictors of Speech Proficiency Among Laryngectomees with ALT Phonatory Tube Reconstruction

Li-Jen Hsin*

**Dept. of Otolaryngology-Head and Neck Surgery, Chang Gung Memorial Hospital, Taoyuan, Taiwan.*

Background

Speech restoration is one of the most important issue concerning reconstruction in patients after total laryngopharyngectomy. Despite anterior lateral thigh (ALT) free flap voice tube reconstruction improved the survival and life quality, some patients still can't talk fluently after the novel technique. The study aims to find the predictors affecting postoperative speech proficiency in order to maek the best treatment plan for this group of patient.

Methods

The prospective study enrolled patients underwent total laryngectomy with ALT phonatory tube reconstruction. The following parameters were collected in 6, 12 and 24 months include GRBAS, acoustic, aerodynamic and speech clarity. The factors of preoperative status and adjuvant therapies were corelated with their speech and voice performences.

Results

Thirty patients that met the inclusion criteria were recruited. The speech function does not differ among various anatomical parameters, preoperative tracheostomy and postoperative chemoradiation. GRBAS was unaffected during 12 months whether the patients had CRT, but roughness remained higher in patients underwent pre-op tracheotomy. Consonant accuracy and words per minute was significantly worse in the post-op CRT group. However, only tone accuracy was affected after 12 months follow-up. Those who underwent pre-op tracheotomy had a worse speech fluency in the 3 months follow-up but showed no differences thereafter.

Conclusion

Laryngopharyngeal cancer patients with pre-op tracheostomy before total laryngopharungectomy and ALT phonatory tube reconstruction would delay their speech production.However, the long-term peech proficiency was not impacted by pre-op tracheotomy, CRT, other malignancies, preservation of posterior pharyngeal wall from laryngectomees underwent phonatory tube reconstruction.

O-6

Acoustic Analysis of Postoperative Speech Impairment in Oral Cancer Surgery

Yutaro Saito*, Takeshi Sato, Ryo Ishii, Kenjiro Higashi, Akira Ohkoshi, Yukio Katori

**Dept. of Otolaryngology-Head and Neck Surgery, Tohoku University Graduate School of Medicine, Sendai, Japan.*

Background

Speech impairment after oral cancer surgery has traditionally been evaluated using subjective indices. Only a few reports have examined the extent of glossectomy and speech impairment using an objective index based on acoustic analysis. The aim of this study was to evaluate the association between the extent of glossectomy and speech outcome measures such as Vowel Articulation Index(VAI), which is a surrogate parameter for description of changes in vowel articulation.

Methods

Speech data were collected postoperatively for 65 patients (31 cases of oral tumor resection except glossectomy, 18 cases of Type Ⅰ,Ⅱ glossectomy (mucosectomy or partial glossectomy), and 16 cases of TypeⅢ,Ⅳ glossectomy (hemi-glossectomy or subtotal glossectomy)). Speech intelligibility rating was assessed from the oral reading task. VAI was also calculated using acoustic analysis.

Results

Speech intelligibility rating shows a speech impediment rate of 6% (Type Ⅰ,Ⅱ glossectomy) and 94% (Type Ⅲ, Ⅳ glossectomy). VAI was significantly lower in the Type Ⅲ, Ⅳ glossectomy groups(VAI=0.871±0.074) than in the Type Ⅰ,Ⅱ glossectomy group(VAI=0.997±0.100)(P<0.001). Speech intelligibility rating and VAI were closely correlated to each other(R=0.51, P<0.001).

Conclusion

VAI may be a better indicator of the degree of speech impairment after surgery. The extent of tongue movement after surgery can be captured by VAI.

O-7

Artificial intelligence application as prognosis evaluation tool after the treatment for voice disorder

Hao-Chun Hu*, Chuen-Heng Wang, Chen-Wei Yu, Chen-Hui Chu, Kai-Jun Li

** Dept. of Otorhinolaryngology-Head and Neck Surgery, Fu Jen Catholic University Hospital, New Taipei, Taiwan.*

Objectives

Artificial intelligence has revealed clinical potential to identify voice disorders through voice recognition. However, studies rarely use artificial intelligence to evaluate treatment outcomes for voice disorders. In this report, we sought to apply artificial intelligence to quantify voice quality and correlate AI values with traditional subjective and objective evaluation values.

Method

We have developed a voice evaluation model by deep metric learning based on the Mandarin pathological voice datasets established in our previous study. Then, we conducted a retrospective review of consecutive patients who received office-based intralesional steroid injection for the treatment of vocal nodule. AI score, voice laboratory measurements, and subjective evaluations were conducted before and after surgery.

Results

Eighteen patients have received office-based intralesional steroid injection for the treatment of vocal nodule. Among them, ten patients showed complete remission and defined as complete remission group, while eight patients showed incomplete remission and defined as incomplete remission group. In the complete remission group, post-operative values revealed significant improvements in terms of AI score, MPT, jitter, shimmer, NHR, and VHI-10 values, compared to pre-operative values. In the incomplete remission group, there was no significant improvements in all values.

Conclusion

This article describes the applicability of AI to evaluate the treatment results of voice disorders. Complete remission or not of vocal lesions revealed significant differences in AI scores. However, there was no significant correlation with other subjective and objective values. Further studies are needed in the future to validate this method.

O-8

Improving the Accuracy of the GRBAS Scale App under the Influence of Noise

Tsuyoshi Kojima*, Koki Hasebe, Shintaro Fujimura, Koichi Omori

**Dept. of Otolaryngology-Head and Neck Surgery, Kyoto University Graduate School of Medicine, Kyoto, Japan.*

The GRBAS scale, one of the auditory psychological assessment methods, is a simple and widely used method to evaluate hoarseness, although it is subjective. We have applied Artificial Intelligence (AI) to provide more objectivity in speech evaluation. In addition, we have shown that deep learning using a one-dimensional convolutional neural network is useful in classifying the severity of voice disorders based on the GRBAS scale. We have also published an iPhone app, GRBASZero, created using Create ML and Core ML provided by Apple for easy evaluation. Such objective evaluation of voice is very important in pre-and post-operative phonosurgery.

Although AI has enabled objective auditory perceptual evaluation without considering intra- and inter-rater reliability, it is necessary to consider noise's influence in clinical practice. In this study, we examined how noise affects the evaluation of the GRBAS scale by AI and aimed to create a less susceptible app. GRBASZero" uses voice recording in a soundproof room, an ideal environment with little noise, for training data. Therefore, it has a low tolerance to noise, and when used in a doctor's office, it often results in G1 instead of G0, even for normal voice. In a study using a model with a one-dimensional convolutional neural network, the estimation accuracy worsened when noise was added to the test data. The evaluation was characterized by a decrease depending on the noise intensity. Adding noise to the training data in advance also improved the learning accuracy and noise tolerance. By using the same method in the creation of the application, the evaluation accuracy can be improved even under noisy conditions, making it easy to use in clinical practice and assisting in medical examinations.

O-9

Withdrawn

O-10

Laryngeal Framework Surgery Using an Ultrasonic Device: Management of Ossified Thyroid Cartilage

Shun-ichi Chitose*, Takashi Kurita, Mioko Fukahori, Fumihiko Sato, Sachiyo Hamanaka, Hirohito Umeno, Kiminori Sato

**Dept. of Otolaryngology, Head and Neck Surgery, Kurume Univeresity School of Medicine, Kurume, Japan.*

Objective

Laryngeal framework surgery (LFS) is the current gold standard for producing optimal vibrations for sound production. However, ossified thyroid cartilage hinders the surgical progress of LFS or other laryngeal surgeries. The success of these procedures is highly dependent on the experience of the surgeon. One way to reduce the burden on patients is to select a device that can manipulate the laryngeal framework.

Surgical methods

Using a piezoelectric knife with a 4 mm wide and 0.55 mm thick blade, we created a window for type I thyroplasty (TPI). A novel approach for arytenoid adduction (AA) using the knife was also devised, in which incisions are made to the posterior edge of the thyroid cartilage while preserving as if opening a door. The usefulness of the knife for making a midline incision in type II thyroplasty (TPII) was then assessed.

Results

The blade size used was perfect for creating a window in a short period of time for TPI. Given the minimal shaving involved, the chondral fragment can be punched out according to the window design and used as an insert material. A wide field of view for AA allows for less rotation of the larynx and not small fenestration without damaging the piriform sinus mucosa. In TPII, a midline incision of the ossified thyroid cartilage can be performed sharply and precisely without damaging the thin endolaryngeal mucosa or the anterior commissure tendon.

Conclusion

A piezoelectric knife with a 0.55 mm thick blade can sharply cut ossified cartilage without damaging endolaryngeal soft tissue. Thus, it is suitable for various types of laryngeal framework surgery.

O-11

Preliminary Experience with a 3-Dimensional Exoscope-Assisted Laryngoplasty

Tetsuji Sanuki*, Naoki Takemoto, Shogo Sumiya

**Dept. of Otolaryngology, Head and Neck Surgery, Nagoya City University, Nagoya, Japan.*

Introduction

Laryngoplasty requires manipulation of the vocal cords, which are not visible during the operation, and the technique's widespread use is limited by the need for adequate knowledge of local anatomy, the small surgical field, and the high level of skill required for the procedure under local anesthesia.

Although it is possible to show the surgeon using a microscope or an endoscope as in otological and nasal surgery, it has not been used in the case of laryngoplasty because the position of the trunk, neck, and head cannot be changed freely and the patient's position is unnatural and unreasonable.

In recent years, an exoscope has been developed that can provide a stereoscopic view similar to that of a microscope, while using the same compact tool as an endoscope.

The study aims to assess whether the 3D exoscopic surgergical technique could be applied in laryngoplasty and if it holds the prospect of ultimately replacing this macro surgery in the future

Methods

This is a retrospective study in which were included 20 patients affected by voice disorders, who underwent surgery using the 3D exoscope or the macro at our hospital. The exoscope and macro groups each included 10 cases. The feasibility of all the surgical steps solely using the 3D exoscope was evaluated. The exoscope group and macro group were compared taking into account the following factors: time of the surgery, and vocal function outcomes, as well as intraoperative and postoperative complications.

Results

No intraoperative or postoperative complications occurred in any of the procedures. The average operative time was 143 minutes in the exoscope group and 135 minutes in the macro group. No significant statistical differences were identified between the two groups ($p > 0.05$). The vocal function outcomes were fully comparable.

Conclusions

While this study represent an initial experience, our results indicate that the exclusive use of the 3D exoscope, as that of the traditional macro surgery during laryngoplasty, is feasible for all open approaches. The use of the 3D exoscopic technique shows promise for future laryngoplasty.

O-12

Endoscopic Arytenoid Reduction under Local Anesthesia for Suspected Arytenoid Dislocation

Chang Hwan Ryu*

**Dept. of Otolaryngology, National Cancer Center, Goyang, Korea.*

Objective

Arytenoid dislocation is a rare disease characterized by decreased movement of the vocal fold after trauma to the larynx. Treatment is manual reduction requiring general anesthesia. Theoretically, vocal fold movement should return immediately after manual reduction. However, Reduction under general anesthesia cannot identify the patient's voice quality in real-time. Herein, I report arytenoid reduction under local anesthesia for patients suspected arytenoid dislocation.

Method

From 2015 to 2020, 5 patients suspected of arytenoid dislocation were included for this study. The suspicion of arytenoid dislocation was diagnosed by history and endoscopic findings. Three were after gynecological surgery and two were after peritoneal cavity surgery cancer (liver and colon cancer). All patients underwent general anesthesia more than 5 hours and were placed an esophageal stethoscope during surgery. All patients denied previous head and neck surgery. All showed limited movement of the left vocal fold. Anterior dislocation of the arytenoid cartilage was suspected. Anesthesia was performed on the laryngeal area through inhalation of 2% lidocaine and injection of 2% lidocaine into the trachea. Arytenoid reduction was performed while sitting in an outpatient chair under guidance of flexible laryngoscope.

Results

All patients completed the procedure under local anesthesia. One patient recovered vocal fold movement immediately after the reduction. Of the remaining 4 patients, 3 recovered vocal fold movement within 7-30 days after the procedure. One did not recover vocal fold movement for 3 months after the procedure. They received vocal fold injection for immediate voice improvement.

Conclusion

Endoscopic arytenoid reduction under local anesthesia has some advantages than that under general anesthesia, which is not also real-time feedback of vocal fold movement immediate improvement but for diagnostic purpose.

O-13

Ten-year outcomes of recurrent laryngeal nerve reinnervation for thyroidectomy-related unilateral vocal fold paralysis: A single-surgeon, prospective study

Seung-Won Lee*

**Dept. of Otolaryngology-Head and Neck Surgery, SoonChunHyang University Hospital, Bucheon, Korea.*

Objectives

We evaluated the long-term outcomes of intraoperative recurrent laryngeal nerve (RLN) reinnervation for the management of thyroidectomy-related unilateral vocal fold paralysis (VFP) during a follow-up period of 10 years.

Methods

The study was performed between March 2006 and July 2022 at Soonchunhyang University Bucheon Hospita l. We enrolled 25 patients who underwent RLN reinnervation using direct neurorrhaphy or ansa cervicalis-to-RLN anastomosis and completed subjective and objective voice measurements over a 5-year period. Of the 25 patients, 10 completed voice measurements over a 10-year period.

Results

At 6 months after reinnervation, most subjective voice parameters and some objective voice parameters were significantly improved ($p < 0.05$). At 12 months after reinnervation, most parameters were significantly improved. The improvements were maintained at 36, 60, 84, and 120 months after reinnervation ($p < 0.05$).

Conclusions

Primary intraoperative RLN reinnervation provided stable voice outcomes for 10 years postoperatively and could be an effective voice rehabilitation option for thyroidectomy-related unilateral vocal fold paralysis.

O-14

Withdrawn

O-15

Time-dependent Changes of Vocal Function by Age Groups Following Laryngeal Reinnervation Combined with Arytenoid Adduction

Kohei Nishimoto*, Eiji Yumoto, Yorihisa Orita

**Dept. of Otolaryngology-Head and Neck Surgery, Kumamoto University, Kumamoto, Japan.*

Objective

To evaluate the temporal changes of vocal function by age brackets following laryngeal reinnervation combined with arytenoid adduction (AA) to treat paralytic dysphonia.

Methods

Sixty-eight patients with unilateral vocal fold paralysis who underwent refined nerve-muscle pedicle flap (NMP) implantation and AA were classified into four groups according to age: under 50 years (–50), 50s, 60s, and 70 years and over (70+). The groups included 15, 14, 22, and 17 patients, respectively. Their vocal function was followed periodically for 24 months postoperatively.

Results

Significant improvements in vocal function were observed during a 24-month follow-up period: maximum phonation time in the –50 and 50s group; pitch range and voice handicap index-10 in the –50, 50s, and 60s groups; “Grade” in the –50, 50s, and 70+ groups; and “Breathiness” and voice-related quality of life in all groups. Although the younger groups tended to show better vocal function compared to the older groups 24 months postoperatively, all age groups showed significant improvement after surgery.

Conclusions

The refined NMP method combined with AA is efficacious for the treatment of paralytic dysphonia in older populations.

O-16

Effect of Aging on Vocal Outcomes after Laryngeal Reinnervation Combined with Arytenoid Adduction

Eiji Yumoto*, Tetsuji Sanuki, Kohei Nishimoto

**Asahino General Hospital, Kumamoto, Japan.*

Objective

To examine the efficacy of laryngeal reinnervation combined with arytenoid adduction (AA) to treat paralytic dysphonia in elderly population by comparing age-dependent improvements of vocal function following surgery.

Methods

Sixty-eight patients with unilateral vocal fold paralysis who underwent refined nerve-muscle pedicle flap (NMP) implantation and AA were classified into four age groups: under 50 years (–50), 50s, 60s, and 70 years and over (70+). Their vocal function including aerodynamics, acoustic analysis, perceptual assessment (GRBAS scale), and subjective assessment (VHI-10 and V-RQOL) was evaluated before surgery and periodically for 24 months postoperatively. Preoperative respiratory function was also measured.

Results

FEV1% was significantly lower in the 70+ group compared to the –50 group. Significant improvements in vocal function were observed during a 24-month follow-up period as reported by one of the coauthors. Preoperatively, maximum phonation time (MPT) and mean airflow rate in the 70+ group, and MPT in the 60s group showed significantly less favorable values compared to those of younger groups. However, no significant differences in vocal function among the 4 groups except pitch range were noted 24 months postoperatively. The 70+ group showed a significantly narrower pitch range than the 50s and 60s groups 24 months postoperatively.

Conclusions

The refined NMP method combined with AA is efficacious for the treatment of paralytic dysphonia in both younger and older populations.

O-17

Treatment Outcomes of Intralesional Steroid Injection for Refractory Vocal Process Granuloma

Chi-Te Wang*

**Dept. of Otolaryngology Head and Neck Surgery, Far Eastern Memorial Hospital, Taipei, Taiwan.*

Objective

The first-line treatments for vocal process granuloma (VPG) generally include vocal hygiene education and antireflux medication. For refractory VPG, the subsequent treatment options remain controversial. This study investigated the treatment outcomes of intralesional steroid injection for refractory VPG.

Methods

We retrospectively reviewed the data of 23 patients with the diagnosis of VPG and failed to improve after undergoing 3 months of daily proton-pump inhibitors (PPI) and vocal hygiene education at a tertiary teaching hospital . The patients underwent up to three courses of monthly in-office intralesional steroid injection as a second-line treatment. The treatment outcomes were determined by measuring the size of VPG, corrected by the length of vocal folds, before and after the last procedure. The patients were divided into clinical responders and nonresponders for further analyses.

Results

The mean corrected VPG size decreased from 27.74 ± 15.05 (mean ± standard deviation) to 5.48 ± 8.95 ($p < .001$, Wilcoxon signed-rank test). Fifteen patients (65.2%) were responsive (size reduction ≥ 75%) to intralesional steroid injection, whereas the other eight patients were nonresponders. Further investigations revealed that habitual alcohol consumption ($p = .03$, Fisher's exact test) and longer symptom duration (>12 m, $p = .01$, Mann–Whitney U test) were associated with a poor response to intralesional steroid injection. By contrast, patients with history of intubation responded significantly more favorably ($p = .02$, Fisher's exact test).

Conclusions

Intralesional steroid injection can be a promising alternative treatment for refractory VPG when first-line treatment fails.

O-18

Local Steroid Injection for Benign Vocal Fold Lesions: Age-Dependent Therapeutic Effect

Kazutaka Kashima*, Kota Matsuyama, Miki Nozawa, Kazuya Kurakami, Ayako Okui, Tomohiro Hasegawa, Mayu Hirosaki, Manami Kamitomai, Takeshi Igarashi, Yusuke Watanabe, Takeharu Kanazawa

**Dept. of Otolaryngology, Jichi Medical University, Saitama, Japan.*

Objective: Benign vocal fold lesions (BVFLs) cause voice disorders and impair social life. Recently, office-based vocal fold steroid injection (VFSI) has gained attention as a minimally invasive treatment for BVFLs. This study aimed to analyze the age-dependent treatment effect of VFSI and to clarify the indications for treatment.

Methods: In this retrospective cohort study, a total of 83 patients with BVFLs were treated with a similar regimen of VFSI. Three or four months after the injection, age-dependent phonological functions were evaluated. The differences between pre- and post-treatment findings were analyzed using the Wilcoxon matched-pair signed-rank test, and the correlation between patient age and improvement rates were determined by Pearson's correlation coefficient.

Results: Improvement in Voice Handicap Index, which was the primary endpoint, was observed. Subjective and objective voice quality measurements also showed significant improvements. Subgroup analyses revealed that there was no age-related difference in the improvement of voice quality and that there was no improvement in aerodynamic effect in patients over 45 years of age.

Conclusion: This study clarified the age-dependent treatment effect of VFSI and provided the important suggestion of establishing indication criteria for BVFLs. The study results provided clarity on the indication criteria of VFSI and served as an important indicator for tailoring treatment to patients' needs.

O-19

Effects of Early Local Administration of High-dose bFGF on a Recurrent Laryngeal Nerve Injury Model

Takao Goto*, Rumi Ueha, Taku Sato, Tatsuya Yamasoba

**Dept. of Otolaryngology and Head and Neck Surgery, Graduate School of Medicine, the University of Tokyo Hospital, Tokyo, Japan.*

Introduction

Research on regenerative medicine using basic fibroblast growth factor (bFGF) has recently advanced in the field of laryngology. We previously reported that local administration of bFGF 1 month after recurrent laryngeal nerve (RLN) paralysis compensated for atrophy of the thyroarytenoid muscle. The objective of this study was to elucidate the effects of early bFGF administration on the thyroarytenoid muscle after RLN transection and to investigate the underlying mechanisms.

Methods

A rat model of RLN paralysis was established in this study. One day after RLN transection, low- (200 ng) or high-dose (2,000 ng) bFGF or saline (control) was administered to the thyroarytenoid muscle. Six larynges for each group were excised for histological and immunohistochemical examinations at 1, 7, 14, 28, and 56 days after administration. The cross-sectional area of the thyroarytenoid muscle in normal and paralyzed sides was compared. In addition, the Ki67-positive (Ki67+) dividing cells, paired box 7–positive (Pax7+) satellite cells (SCs), and myogenic differentiation–positive (MyoD+) myoblasts were counted. Furthermore, the neuromuscular junction (NMJ) was identified from the expression of acetylcholine receptor and synaptic vesicles, and evaluated with time.

Results

The cross-sectional thyroarytenoid muscle area was significantly larger in the high-dose group than in the saline and low-dose groups on days 28 and 56. Immunohistochemistry indicated that high-dose bFGF significantly increased the number of Ki67+ differentiating cells, Pax7+ satellite cells, and MyoD+ myoblasts in the thyroarytenoid muscle with peaks on day 1, 1, and 14, respectively. Similarly, high-dose bFGF significantly increased NMJs on days 28 and 56.

Discussion

A single, early local administration of high-dose bFGF prevented atrophic changes in the thyroarytenoid muscles by activating satellite cell proliferation and reforming NMJs. As increased neuromuscular junctions are expected to maintain myofiber volume, bFGF administration may prevent thyroarytenoid muscle atrophy in the mid to long term.

O-20

Comprehensive Evaluation of Vocal Outcomes and Quality of Life After Total Laryngectomy and Voice Restoration with J-Flap and Tracheoesophageal Puncture.

Wanni Lin*

**Dept. of Otorhinolaryngology, Head and Neck Surgery, Chung Gung Memorial Hospital, Linkou Medical Center, Taoyuan, Taiwan.*

Background

Tracheoesophageal puncture with a voice prosthesis is the gold standard for speech rehabilitation in patients that receive a laryngopharyngectomy. However, a novel surgical technique, using a tubularized anterolateral tight flap, named “J-flap”, has been demonstrated to produce adequate voice restoration. We aimed to compare the outcomes and the quality of life of patients who underwent voice rehabilitation with both techniques.

Methods

We enrolled patients that underwent laryngopharyngectomy and voice restoration surgery. The control group received a tracheoesophageal puncture with a voice prosthesis, while the study group received J-flap reconstruction. A total of 20 patients received voice prosthesis rehabilitation, while 18 received Jflap reconstruction. Speech and vocal outcomes and quality of life metrics were collected.

Results

The objective phonatory performances and the acoustic voice analysis did not outline a significant difference. Speech pathologists judged the consonant pronunciation in the J-flap group as less accurate ($p < 0.001$). The voice handicap index revealed a moderate impairment for the J-flap group ($p < 0.001$). Quality of life scores were higher for the voice prosthesis group.

Conclusion

Voice prostheses and J-flaps share similar objective phonatory outcomes. Quality of life was more impaired in the J-flap group. In our view, these two techniques possess complementary characteristics in clinical practice, taking into account health care system regulations and patients’ social background.

O-21

A Case in which Dynamic Analysis by Multi-row CT was Useful in Determining the Treatment Strategy for Tracheal Stenosis

Daisuke Inukai*, Hiromu Nakamura, Shumpei Yamanaka, Takashi Maruo, Tetsuya Ogawa, Yasushi Fujimoto

**Dept. of Otorhinolaryngology-Head and Neck Surgery, Aichi Medical University, Aichi, Japan.*

Introduction

Tracheal stenosis can be congenital or rarely occurs after prolonged endotracheal intubation or tracheostomy, and can sometimes be a serious airway emergency. The precise assessment of the site of stenosis is desirable for treatment, and CT and endoscopy are the two most useful examinations. However, due to changes over time caused by breathing and vocalization of the glottis, CT can be difficult to properly evaluate, especially with subglottic stenosis. Endoscopic evaluation of the subglottis and trachea are also difficult.

Case and Course

A 15-year-old male was referred from local otorhinolaryngology clinic to our hospital because of suspected subglottic stenosis. He had a history of endotracheal intubation for general anesthesia surgery when he was 9 years old, but there were no special notes at the time of intubation. CT revealed a tracheal stenosis at the level of the cricoid cartilage. The endoscopic findings suggested the presence of a prominent stenotic origin at the subglottic level, and the possibility of overlapping subglottic stenosis could not be ruled out. Therefore, we performed dynamic imaging of the larynx during vocalization, nonvocalization, and respiratory fluctuation using a multi-detector CT, which is now under study with the approval of the Ethics Committee of our University. It was found that the area of tracheal stenosis was fixed with little dynamic change, and that the origin of the stenosis was not not observed in the subglottis. A tracheotomy was performed, the scar stenosis site was electrocautery scalpel cauterized under general anesthesia, balloon dilation was performed, and a T-tube was implanted. After confirming that there was no restenosis, the T-tube was removed after 6 months, and the tracheal foramen was closed.

Consideration

The pathophysiology of tracheal stenosis varies widely and requires careful consideration before therapeutic intervention. We have experienced a case in which dynamic analysis using multi-detector CT was useful in evaluating the stenosis and deciding on a treatment plan in a patient with tracheal stenosis. Since this analysis can dynamically observe areas that change with breathing and speech, it will be useful in situations where strict evaluation of the area is required, such as airway stenosis.

O-22

Ultrasound imaging of the cricoarytenoid joint

Chikako Kunieda*, Fumiaki Nin, Tomohiro Mori, Takenori Ogawa

**Dept. of Otolaryngology, Hashima City Hospital, Hashima, Japan.*

Introduction

As one of the examinations of patients with voice disorders, we used functional laryngeal ultrasonography, which allows dynamic observation of the bilateral arytenoid cartilages on one image. We visualized from the body of the arytenoid cartilage to the vocal process of the arytenoid.

In this study, we focused on the cricoarytenoid joint, a pivot in the adduction and abduction of the vocal folds. Pathologically, chronic inflammation spreads to the synovial membrane of the joint cavity and impairs its mobility in rheumatoid arthritis. However, there are no reports of ultrasound imaging of these findings. Although the tissue behind the severe calcification is undetectable in ultrasound, ultrasound is more useful than CT for imaging the moderate-calcified arytenoid cartilage. In addition, synovial thickening and synovitis in the joint capsule are also detectable by ultrasound. Therefore, we first attempted to image the cricoarytenoid joint in a healthy patient.

Methods

We used the US system Aplio i800 (Canon Japan) and selected a linear array transducer for scanning.

Results

The patient was a 38-year-old woman with no voice disorders. By placing the probe longitudinally on the left neck, the cricoarytenoid joint was visualized during spontaneous breathing. On the image of the arytenoid cartilage, the cartilaginous and calcified regions were hypoechogenic and hyperechoic, respectively. As for the surrounding tissues on the image, the joint space between the arytenoid and cricoid cartilages was hypoechoic, while the soft tissue surrounding the muscular process was slightly hyperechoic. The synovial membrane was undetectable. Notably, the sliding movement of the muscular process of the arytenoid could be captured during /m:/ hamming phonation.

Conclusions

These findings on the ultrasound imaging are likely to contribute to detect the dislocation of the arytenoid cartilage and diagnose the arthritis in larynx.

O-23

Anatomical Features of Recurrent Laryngeal Nerve Paralysis Cases Due to Aortic Aneurysm Using Three-dimensional Computed Tomography Imaging

Jumpei Sasakawa*, Takao Goto, Taku Sato, Rumi Ueha, Tatsuya Yamasoba

**Dept. of Otolaryngology, Tokyo Metropolitan Children's Medical Hospital, Tokyo, Japan.*

Background

Cardiovocal syndrome is a recurrent laryngeal nerve paralysis (RLNP) due to cardiovascular disease typically caused by aortic aneurysm (AA). The possible mechanisms of RLNP by AA include AA stretching and compression between the aortic arch and pulmonary artery. However, detailed reports examining the degree of stretch and compression of the recurrent laryngeal nerve (RLN) by AA are unavailable. In this study, we aimed to clarify the anatomical characteristics of AA-associated RLNP cases from three-dimensional computed tomography (3DCT) images.

Methods

Among the patients diagnosed with vocal fold paralysis (VFP) from 2013 to 2022 at our outpatient clinic, we selected those with AA upon VFP examination (non-operative group), those with VFP after AA surgery (postoperative group), and those with normal aorta (control group) and included six patients with chest CT data available in each group. To evaluate the anatomical relationship between the RLN and AA running, we created 3DCT images using an image reconstruction software and developed the cross-section along the path that passed near the subclavian artery and tracheoesophageal groove and had the smallest circumference of the aortic arch. As an RLN stretching indicator, we measured the circumference in the cross-section and compared the mean length of each group. To evaluate the compression between the aortic arch and pulmonary artery, we evaluated the disappearance of their gap.

Results

The mean circumferences of AA were 178.3, 117.5, and 90.0 mm in the non-operative, postoperative, and control groups, respectively. The circumference in the non-operative group was significantly longer than that in other groups ($p < 0.01$). All cases in the non-operative group showed compression findings between the aortic arch and pulmonary artery.

Conclusion

In this study, compression findings were observed in the non-operative group, indicating that compression could cause neuropathy in RLN. Though the RLN was significantly more stretched by AA in the non-operative group compared to that in other groups, whether the stretch alone causes paralysis remains unclear. In AA cases, 3DCT imaging analysis along the RLN running may be useful in assessing the risk of RLNP.

O-24

Pathophysiological Mechanisms Underlying Unilateral Vocal Fold Paralysis: An Ultrasonographic Study

Yi-An Lu*, Yun-Chen Tsai, Wan-Ni Lin, Yu-Cheng Pei, Tuan-Jen Fang,

** Dept. of Otolaryngology Head and Neck Surgery, Chang Gung Memorial Hospital at Linkou, Taoyuan, Taiwan.*

Objective

Laryngeal ultrasonography has been suggested as an alternative diagnostic tool for unilateral vocal fold paralysis (UVFP). The present study applied laryngeal ultrasonography (LUS) and quantitative laryngeal electromyography (QLEMG) in female UVFP patients to investigate the pathophysiologic mechanisms of UVFP.

Study Design: prospective cohort study

Setting

Patients with UVFP were evaluated using LUS and QLEMG.

Methods

The vocal fold (VF) length parameters included resting and phonating VF length measured by B-mode LUS, and color Doppler vibrating length (CDVL) measured by color Doppler mode.

Results

Forty female patients with UVFP were enrolled, among whom eleven and 29 were assigned to the TA+CT (with SLN injury) and TA (without SLN involvement) groups, respectively. Among all the subjects, the turn ratio in the thyroarytenoid-lateral cricoarytenoid muscle complex (TA-LCA) correlated with the resting vocal fold length (R=0.314; P=0.049) and color Doppler vibrating length (CDVL) (R=0.466; P=0.004) on the paralysis side. In the TA+CT group, the turn ratio in the CT muscle correlated with the normalized phonatory vocal length change (nPLC) (R=0.621; P=0.041) on the paralysis side.

Conclusion

The severity of RLN injury, which was reflected by the remaining recruitment in TA-LCA, can be predicted by the resting VF length as well as CDVL during phonation using LUS. The severity of SLN injury, represented by the recruitment of CT, can be predicted by the decrease in the shortening ability of the vocal fold during phonation. These findings support the potential usefulness of LUS in evaluating “the severity of nerve injury” in UVFP.

O-25

Modified Killian’s Method for Flexible Nasopharyngoscopic Observation of the Hypopharynx: A systematic Review and Meta-analysis

Yi-Chan Lee*, Yu-Ling Liao

**Chang Gung Memorial Hospital, Taoyuan, Taiwan.*

Objective

Flexible nasopharyngoscopy is a common procedure for evaluating the hypopharynx. The modified Killian's method has been reported to enhance visualization during this examination. The aim of this study was to compare the visibility of the hypopharynx using conventional and modified Killian's methods.

Methods

A systematic literature search was conducted in PubMed, EMBASE, and the Cochrane Library to identify studies that compared the visibility of the hypopharynx using the two methods. Comprehensive Meta-Analysis software was used to analyze the data. Studies that evaluated the overall hypopharyngeal visibility score and the visibility of the pyriform sinus, postcricoid area, and upper esophageal sphincter were included.

Results

Five studies were included in the analysis. The pooled results showed that the modified Killian's method significantly improved overall visibility score (SMD = 1.09; 95% CI, 0.39 to 1.80) and visibility of the pyriform sinus, postcricoid area, and upper esophageal sphincter (log OR = 3.83; 95% CI, 2.30 to 5.35; log OR = 4.20; 95% CI, 3.21 to 5.19; log OR = 3.38; 95% CI, 1.68 to 5.08).

Conclusion

The modified Killian's method is a valuable technique for improving hypopharyngeal visibility during flexible nasopharyngoscopy. This technique can enhance the detection of potential lesions of the hypopharynx, leading to better diagnostic accuracy and improved patient outcomes.

O-26

Laryngeal Electromyography Guided Hyaluronic Acid Injection Laryngoplasty for Unilateral Vocal Fold Paralysis

Chen-Chi Wang*

*****_Taichung Veterans General Hospital, Taichung, Taiwan._

Unilateral vocal fold paralysis (UVFP) is a common disorder in the practice of otolaryngology. Incomplete vocal fold adduction in UVFP may cause formation of a constant glottal gap, which is usually associated with breathy voice and aspiration during swallowing that jeopardize their quality of life. Therefore, the patients usually want to know the disease prognosis and are eager to be relieved from symptoms by a simple and fast way. Laryngeal electromyography (EMG) is the only test that can provide laryngologists with the neuromuscular status and prognostic information of patients with unilateral vocal fold paralysis (UVFP).

Compared to normal side vocal fold, the paralyzed thyroarytenoid/lateral cricoarytenoid (TA/LCA) muscle complex usually show characteristic signals on laryngeal EMG such as fibrillation signal when the patient keeps silent; or reduced recruitment of motor unit potentials when the patient phonates vowel /i/. By using a 25 to 26-gauge monopolar injectable needle electrode, 1 ml of commercially available forgiving filler such as hyaluronic acid could be delivered into the TA/LCA muscle complex of paralyzed vocal fold via the transcervical cricothyroid membrane puncture under laryngeal EMG guidance.

The injection augmentation could be done when the patient is in a relatively stable and comfortable supine position without the need of laryngoscopy. We have done the procedure since year 2010 in more than 500 patients safely. The injection augmentation effect may last long term and open surgery could be avoided in about 40% of our patients. If patients experienced symptoms recurrence after absorption of fillers, prognostic information obtained from laryngeal EMG could be used to guide further management such as repeated injection for patients with good prognosis or prompt thyroplasty type I for patients with poor prognosis.

Laryngeal Electromyography (LEMG) Guided Hyaluronic Acid Injection Laryngoplasty is an ideal initial management for patients of UVFP. It is a simple, convenient, minimally invasive management of UVFP.

O-27

Prolonged Effects of Hyaluronate Injection in Adolescent Unilateral Vocal Fold Paralysis

Tuan-Jen Fang*, Yu-Cheng Pei, Yi-An Lu, Wan-ni Lin, Li-Jen Hsin

**Linkou Chang Gung Memorial Hospital, Chang Gung University, Taoyuan, Taiwan.*

Objective

Children who experience unilateral vocal fold paralysis (UVFP) before puberty may have long-lasting hoarseness even after the period of voice change. The op, timal management approach for these patients remains unclear. This study aims to evaluate the safety and efficacy of a single session of hyaluronate injection in patients with UVFP that occurred before puberty.

Materials and Methods

We retrospectively reviewed the medical records of patients with UVFP-related hoarseness before age 18 who received a single hyaluronate injection between January 1, 2015, and December 31, 2020. Patient-reported outcomes, video stroboscopy, and perceptual voice analysis were evaluated before injection and at one month and every six months thereafter.

Results

Twelve patients (7 males and 5 females) with a mean age of 16.5±2.5 years were included. The onset of UVFP symptoms occurred at a mean age of 6.6±7.6 years. After hyaluronate injection, 9 out of 12 patients (75%) reported satisfaction with their voice at the 1-month follow-up evaluation. At a median follow-up of 24.1 months, only 1 out of the 9 patients received another treatment, while the voice outcomes remained consistent in the others after a single session of hyaluronate injection.

Conclusions

A single session of hyaluronate injection laryngoplasty can be considered as a first-line treatment for adolescent UVFP, with most patients experiencing prolonged effects.

O-28

Application of Artificial Intelligence-Based Ultrasonic Image Analysis in Patients Receiving Injection Laryngoplasty for Unilateral Vocal Paralysis

Wen-Hsuan Tseng*, Ming-Sui Lee, Tze-Hsiang Wang, Tzu-Yu Hsiao, Tsung-Lin Yang
**Dept. of Otolaryngology, National Taiwan University Hospital, Zhubei, Taiwan.*

Aims

Hyaluronic acid (HA) can be degraded over time. However, persistence of the effects after injection laryngoplasty (IL) for unilateral vocal fold paralysis (UVFP), longer than expected from HA longevity, has been observed. Yet, little information on the status of the remnant injectable materials is known. The purpose of the study was to develop a clinical methodology for objective evaluation of the temporal change in HA volume after IL using artificial intelligence (AI)-based ultrasonic assessment.

Methods

Adult patients who had undergone IL with HA for UVFP were recruited. Distribution of injected HA was identified, and serial sections were obtained on ultrasonography. A recurrent neural network-based image sequence segmentation model was introduced to extract both spatial and temporal information.

Main outcome measures

Volume estimation was performed using ultrasound images by the automatic algorithm as well as clinical voice evaluation at 2 weeks, and 2 and 6 months after IL. Voice outcomes included the voice handicap inventory (VHI-10), perceptive evaluation methods (grade, roughness, breathiness, asthenia, strain (GRBAS scale), maximum phonation time (MPT) and the normalized glottal gap area (NGGA).

Results

The resultant contours of the HA area were captured in detail for all participants. VHI-10, MPT, GRBAS and NGGA were significantly improved at 2 weeks, 2 months and 6 months compared to pre-injection and remained stationary. In comparison, estimated residual HA volume decreased significantly across time points (1.26 at 2 weeks, 0.70 at 2 months, $P< 0.001$; 0.37 at 6 months, $P< 0.001$). Of the 30 patients, 3 received secondary procedures after 2 months. There were no significant differences in clinical voice parameters at baseline and 2-week. At 2 months, significantly larger NGGA ($P= 0.002$) and shorter MPT ($P= 0.004$) were noted in 2nd-IL group. The remaining volume percentage at 2 months was lower in 2nd-IL group (49.52%) compared to no secondary procedure group (56.85%).

Conclusions

The volume change of the injected HA over time for an individual was estimated non-invasively by AI-based ultrasonic image analysis. The prolonged effect after treatment, longer than HA longevity, was demonstrated objectively for the first time. The information is beneficial for achieving optimal cost-effectiveness of IL.

O-29

Transoral videolayngoscopic vocal fold medialization with calcium phosphate cement for unilateral vocal cord palsy – Experience of original technique

Masahiko Seki*, Kosuke Uno, Akihiko Shiotani, Koji Araki

**Dept. of Otolaryngology, National Defense Medical College, Saitama, Japan.*

We have been performing injection laryngoplasty with calcium phosphate cement (CPC, BIOPEX-R, HOYA) under microlaryngeal setting for unilateral vocal fold paralysis (UVFP) since 2003. CPC is commercially available in Japan as a kit for bone reconstruction and has been shown to be safe. CPC is a self-hardening paste that recrystallizes into calcium hydroxyapatite (CaHA) in the body within minutes of injection. Although a non-self-hardening injectable CaHA gel (RADIESSE® Voice, Merz Aesthetics) is commercially available in the US, its properties as an injectable material differ significantly from those of CPC. Recently, we have established transoral videolaryngoscopic vocal fold medialization in addition to conventional CPC injection.

The tips for the original techniques are as follows. Exposure of the surgical field of the posterior glottis using a distending laryngoscope (FKWO retractor, Olympus Medical Systems) and an HD videoendoscope with an articulating tip (Endoeye flex, LTE-S190-5, Olympus Medical Systems). The tracheal tube is tilted anteriorly by inserting the blade between the tube and the posterior wall of the pharynx. After simulating the medialization of the arytenoid cartilage by manually confirming it by pressing the muscular process of the arytenoid cartilage from the side of the pyriform sinus, CPC is injected into the deep outer side of the vocal process and the fixation of the arytenoid cartilage is performed by the same procedure. After confirming the fixation of the adducted arytenoid by pushing the vocal process, the glottis exposure is changed to a normal position and CPC is injected into the paraglottic space.

Twenty patients with severe hoarseness (preoperative MPT less than 4 seconds and MFR greater than 400 ml/sec) due to UVFP who underwent CPC injection were analyzed. MPT, MFR, Grade and Breathy on the GRBAS scale at 1 year (or 6 months) were significantly improved postoperatively. Better glottic closure with CT imaging in both horizontal and vertical sections was observed in patients with the original technique (N=10) compared to the conventional method (N=10).

We believe that transoral videolayngoscopic vocal fold medialization has the potential to be a surgical option for patients with severe symptoms caused by UVFP.

O-30

Real-Time Light-Guided Vocal Fold Injection via the Cricothyroid Membrane in Unilateral Vocal Fold Paralysis: A Human Pilot Study

Wonjae Cha*, Gene Huh, Pil Geun Jang, Seoung Hoon Han, Ramla Mohammad, Woo Jin Jeong, Gene Huh

** Seoul National University Bundange Hospital, Seoul, Korea.*

Objectives: Vocal fold injection (VFI) via the cricothyroid (CT) membrane is used to treat various diseases affecting the vocal folds. The technical challenges of this technique are mainly related to the invisibility of the needle. Real-time light-guided VFI (RL-VFI) was recently developed for injection under simultaneous light guidance in the CT approach. Herein, we present the first clinical trial of RL-VFI, in which we investigated the feasibility and safety of this new technique in unilateral vocal fold paralysis (VFP).

Methods: This prospective pilot study enrolled 40 patients, who were treated with RL-VFI for unilateral VFP between September 2020 and August 2021. Adverse events were monitored during the procedure and for 4 weeks postoperatively. The Voice Handicap Index-10, the GRBAS (grade, roughness, breathiness, asthenia, and strain) scale, aerodynamic studies, and acoustic analyses were evaluated to compare the voice improvement after 4 weeks with the baseline values.

Results: The needle tip was intuitively identified by the red light. The mean procedure time was 95.6±40.6 seconds for the initial injection, while the additional injection required 79.2±70.5 seconds. The injection was performed under light guidance without additional manipulation after the needle reached the intended point. No acute or delayed adverse events were reported. Among the 40 patients, 36 completed voice analyses after 4 weeks. Subjective and objective voice parameters, including the Voice Handicap Index-10, GRBAS scale, maximum phonation time, mean expiratory airflow, fundamental frequency, jitter, shimmer, and noise-to-harmonics ratio improved significantly after RL-VFI ($P<0.05$), while the expiratory volume was maintained.

Conclusion: RL-VFI is feasible and safe for treating patients with unilateral VFP. This technique is anticipated to improve the precision and safety of the CT approach in the treatment of unilateral VFP. This study provides a rationale for further structured clinical studies.

O-31

Endoscopic Thyroarytenoid Myoneurectomy in Patients with Adductor Spasmodic Dysphonia

Han Su Kim*, Soo Yeon Jung, Jeong Min Lee

** Dept. of Otorhinolaryngology, College of Medicine, Ewha Womans University, Seoul, Korea.*

Backgrounds

Spasmodic dysphonia (SD) is a laryngeal form of dystonia related to intermittent or continuous overclosure of vocal folds resulting in involuntary phonatory breaks and an effortful, strained-strangled voice quality during speech. Although the precise etiology is not yet defined, SD is presumed to be a “neurological” voice problem, with abnormality in the laryngeal motor function regulated by the central nervous system. Currently, the preferred treatment for SD is repeated botulinum toxin injection into one or both vocal fold muscles to weaken the laryngeal adductor muscles. Therefore, surgical treatments have been introduced; however, the recurrence rate for SD is yet high. In this regard, the current study aimed to evaluate the short-term outcomes of myomectomy with LASER combined with neurectomy using a specially designed electrical surgical knife to selectively cut recurrent laryngeal nerve branches. Therefore, as a pilot phase of research, this investigation aimed to examine the short-term (i.e., 6 months) outcome of this surgical technique on SD patients as a reliable surgical procedure, measured by subjective and objective voice assessments.

Material and methods

Twenty-eight consecutive patients with SD underwent serial endoscopic laser thyroarytenoid myoneurectomy from 2021 to 2022. Informed consent was obtained from all patients before the procedure and the surgery was performed by a single surgeon (H.S. Kim). The surgery candidates were selected if they met the following criteria: 1) auditory-perceptual and endoscopic exam results presenting evidence of phonatory breaks with strained-strangled voice quality, and no obvious tremor during phonation by experienced otolaryngologists, 2) good responders to previous intracordal botox injections, 3) unsuccessful trials of other medical treatments including voice therapy, and 4) patients’ decisions opting for surgery to obtain definitive treatment. Demographic data, complications, subjective improvement of vocal symptoms and acoustic data were analyzed.

Results

Twenty-eight patients with a provisional diagnosis of SD consisting of 4 men (14.3%) and 25 women (87.7%) (mean age, 35.9 years; range, 22 to 50.1 years) received the surgery. Vocal fold paralysis was not reported in any patients. Postoperative granulation on the incision site was noted in four patients which resolved within a month. One patient complained of odynophagia after the surgery. Furthermore, the current study was able to follow up with 14 patients with subjective voice handicap index (VHI) and objective voice assessments (jitter, shimmer, spectral, and cepstral acoustic measures). Results indicated that the mean score of VHI significantly improved from 92.62(±13.54) to 58.31(±25.99) ($p = 0.003$). Four patients (28.6%) reported a 90% marked improvement in voice

quality and six patients reported (42.9%) moderate to a marked improvement in vocal quality after surgery. Moreover, four patients reported less than 60% improvement, which was reported as less successful.

Conclusion

Based on the follow-up reports, we conclude that the transoral approach to laser myoneurectomy of the thyroarytenoid muscles could be a promising treatment for SD patients. Specifically, the current approach could serve as a second-step procedure in patients with botulinum toxin resistance or lower compliance to other forms of therapy.

O-32

Two Cases of Laryngeal Stenosis Treated with Endoscopic Wedge Excision

Tsunehiro Oka*, Hirohito Umeno, Fumihiko Sato, Tomoki Ito, Masahiro Seki, Toshihiko Kawaguchi, Shin-ichi Chitose

**Dept. of Otolaryngology, Head and Neck Surgery, Kurume Univeresity School of Medicine, Kurume, Japan.*

Introduction

Laryngeal stenosis can be caused by iatrogenic (e.g., endotracheal intubation or tracheostomy), traumatic (e.g., traffic trauma or inhalation injury) or idiopathic, and can cause dyspnea and hoarseness. In 2020, Ekbom et al. devised the endoscopic wedge excision (EWE) for subglottic stenosis and reported its efficacy. In this study, we report two cases of laryngeal stenosis that were successfully treated with EWE.

Case 1

A 73-year-old woman. She presented to our department with dyspnea and dysphonia without any triggers. Laryngeal endoscopic examination revealed a circumferential stenosis of the laryngeal vestibule. After tracheostomy, EWE was performed. There was no postoperative restenosis, and the tracheocutaneous fistula closure was performed 2 months after EWE. The patient is still alive without recurrence.

Case 2

A 15-year-old male. He was endotracheally intubated for croup syndrome in infancy and subsequently underwent tracheostomy due to subglottic stenosis. He requested cannula-free tracheostomy, and EWE was performed. Six months after surgery, mild stenosis was observed, but there was no dyspnea. The patient has been doing well since then, and is scheduled for tracheocutaneous fistula closure.

Discussion

EWE is a technique in which the stenosis is divided into three or four wedge-shaped sections and a narrow bridge is left between each section. Compared to conventional endoscopic balloon dilation or cricotracheal resection for subglottic stenosis, EWE is less likely to cause postoperative restenosis or voice disorders. In this case, EWE was also performed for supraglottic stenosis, and good results were obtained. Therefore, it was suggested that EWE is an effective technique for supraglottic stenosis.

Conclusion

We experienced two cases of laryngeal stenosis that were successfully treated with EWE, which is a technique that is less likely to cause postoperative restenosis or voice disorders, and is effective not only for subglottic stenosis but also for supraglottic stenosis.

O-33

Nonintubated General Anesthesia with High-flow Nasal Oxygenation for Laryngeal Surgery: A Case Series

Ting-Shou Chang*, Yu-Ting Kuo, Yuan-Yi Chia

*Kaohsiung Veterans General Hospital, Kaohsiung, Taiwan.

Background

Laryngeal surgery typically requires intubated general anaesthesia. Although nonintubated general anaesthesia (NIGA) with high-flow nasal oxygenation can be applied with laryngeal surgery, a muscle relaxant is required, which can cause apnoea and hypercapnia. This study aimed to assess the feasibility and safety of laryngeal surgery performed under nonintubated spontaneous breathing general anesthesia with the utilization of high flow nasal oxygenation.

Methods

This single-centre study enrolled a cumulative total of 43 adult patients. All patients received NIGA with high-flow nasal oxygenation and were divided into an apnoea group (n = 21), which received muscle relaxant, and a spontaneous breathing group (n = 22). The PaCO2 of the postoperative arterial blood gas was the primary outcome. The acoustic voice parameters were the secondary outcomes.

Results

The average (standard deviation) values of PaCO2 in the two groups were 97.50 (24.93) and 54.77 (8.76) mmHg, respectively (p<.001). The mean postoperative pH values were 7.14 (0.07), and 7.33 (0.04), respectively (p<.001). During the laryngeal surgery, the mean HR (83.29 [19.24] bpm) and NBPs (142.83 [24.73] mmHg) in the apnea group were higher than those in the spontaneous ventilation group (HR 77.93 [16.79] bpm and NBPs 129.07 [26.45] mmHg) (p<.001). There was no significant difference in the improvement of acoustic voice parameters between the two groups. .

Conclusions

Using non-intubated spontaneous breathing general anesthesia with high-flow nasal oxygenation represents an alternative approach for conducting laryngeal surgery. This anesthesia technique allows patients to sustain spontaneous breathing and effectively eliminate CO2, thereby reducing the risks of hypercapnia and acidosis, even during laryngeal surgeries lasting longer than 30 minutes.

O-34

Salvage Transoral Laser Microsurgery for Recurrent Glottic Cancers

Chun-Ting Lu*, Fang-Yu Chang, Tuan-Jen Fang

** Dept. of otolaryngology, Head and Neck Surgery, New Taipei Municipal Tucheng Hospital (Built and Operated by Chang Gung Medical Foundation, New Taipei, Taiwan.*

Background

Both radiotherapy (RT) and transoral laser microsurgery (TLM) are effective for managing early to moderate laryngeal cancer and have comparable high cure rate. In recurrent cases, total laryngectomy is still the gold standard, but salvage TLM is an alternative for selected cases with the advantage of organ preservation.

Methods

Records of 28 patients who received salvage TLM for recurrent laryngeal cancer between 2002 and 2022 were reviewed. According to previous histologic reports of recurrent pattern, we took a narrow margin excision for recurrences after primary laser surgery. For the recurrences after primary RT, wide margin cordectomies were performed.

Results

Patients were divided into 2 groups as TLM group (N=20) and RT group (N=8) by their primary treatment types. The mean age of recurrence was 68.7 years in TLM group and 64.3 years in RT group. Most of the recurrent cancers (25/28, 89%) were clinical T1-2 without nodes or distant metastasis. The Median survival time (overall survival) after salvage TLM was 110 months in TLM group and 105 months in RT group respectively. Overall survival showed no significant differences between the two groups (Log rank test, $p = 0.58$). Neither disease-specific survival nor laryngectomy-free survival revealed significant differences. Meanwhile, age of recurrence was the only prognostic factor that affected overall survival (Cox regression, Hazard ratio= 1.12, $p= 0.001$).

Conclusions

Although total laryngectomy remains the mainstay in managing recurrent laryngeal cancer, TLM may be an alternative for selected patients with small recurrent tumor. No matter after initial RT or TLM, salvage TLM provides patients the opportunity to achieve organ preservation and better life quality.

O-35

The Novel 445-nm Blue Laser in Laryngeal Surgery: from Basic to Clinical Applications

Ying-Ta Lai*, Cong-Kai Lin, Yi-Ping Chen, Seth Dailey

**Shuang Ho Hospital- Taipei Medical University, New Taipei, Taiwan.*

Objective

Photoangiolytic lasers are widely used in laryngeal surgeries, especially for vascular lesions on vocal folds. However, pulsed dye laser or potassium-titanyl-phosphate (KTP) laser has drawbacks which limit the development in the future. Recently, a novel 445-nm laser has been developed for clinical use (WOLF TruBlue laser, A.R.C. Laser GmbH, Nuremberg, Germany). The chick chorioallantoic membrane (CAM) represents a suitable model for testing various settings to find out the most optimal settings of this laser. This study used the CAM model to examine whether successful photoangiolytic effects could be obtained using BL.

Methods

50 CAM with 1-3 degrees of capillaries were tested by using blue laser via 400-μm diameter fiber, single shot, and power varied systematically at standardized fiber-to-vessel distances of 2 and 5 mm. Outcome measures including intravascular coagulation (IC) and rupture and visible tissue effects.

Results

A working distance of 5 mm resulted in higher ablation and less vessel rupture compared with 2 mm at these optimal energy levels. The 2-mm working distance resulted in lower tissue effects than 5 mm.

Conclusion

Blue laser is effective in vessel ablation using relevant combination of working distance and energy levels. The 445 nm Blue laser is likely to be effective in treatment of types of vocal fold lesions that have been successfully treated using other angiolytic lasers.

P-1

Vocal Fold Immobility after the First Dose of the Oxford-AstraZeneca COVID-19 Vaccine with Recovery: A Case Report and a Systemic Review

Yi-Chieh Lee*, Yi-An Lu,

**Department of Otolaryngology-Head and Neck Surgery, New Taipei Municipal Tucheng Hospital, New Taipei, Taiwan.*

Introduction

The disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), coronavirus disease 2019 (COVID-19), has been a pandemic since early 2020. Vaccination remains the safest and most effective method of disease prevention and control. However, the adverse effects of vaccination are not fully assessed due to the relatively short term of usage. We reported two cases of unilateral vocal fold palsy (UVFP) after the first dose of the Oxford/AstraZeneca (AZ) COVID-19 vaccine. This research aimed to review the occurrence and consequences of this unusual side effect.

Review Methods

According to PRISMA guidelines, we performed literature searches of the MEDLINE, PubMed, and EMBASE databases from November 2019 to July 2022 to search for the results of vocal fold immobility following COVID-19 vaccination.

Results

The literature review revealed three previous reports of COVID-19 vaccine-related vocal fold immobility from the United Kingdom, South Korea and the United States. With the addition of our patients, a total of twenty-three patients with a mean age of 62.2 years were included. There were 8 females and 15 males. Most (78.3%) of them had unilateral vocal fold involvement, and 82.6% of the cases were related to mRNA-type vaccines. In 2021, we encountered two female patients who developed UVFP shortly after their first dose of the Oxford/AstraZeneca COVID-19 vaccine. One of them had no abnormal signal in a laryngeal electromyography (LEMG) exam, and the vocal immobility resolved spontaneously three months after vaccination. The other patient showed a decrease in recruitment and an increase in spontaneous activity in an LEMG exam. She underwent intracordal hyaluronic acid injection over the right side a month after the first clinic visit due to her vocal demand. Vocal function recovered four months after receiving the AZ vaccine.

Conclusion

Isolated vocal fold immobility is a rare complication following the COVID-19 vaccine. Although causation cannot be proven, a correlation is established. Vocal fold immobility following vaccination is a potential complication we should keep in mind. Close surveillance with conservative and temporary intervention may be suggested based on the current understanding.

P-2

Management of Bilateral Vocal Fold Paralysis with Laterofixation

Ryota Yuasa*, Takumi Kumai, Akihiro Katada

**Dept. of Otolaryngology-Head and Neck Surgery, Asahikawa Medical University, Asahikawa, Japan.*

Bilateral vocal cord paralysis often causes severe dyspnea requiring an early airway intervention. As arytenoidectomy and posterior cordectomy are traumatic and the loss of vocal fold is permanent, laterofixation is a safe and reversible approach to treat bilateral vocal cord paralysis.

In this case series, we present seven cases of bilateral vocal cord paralysis managed with laterofixation of the vocal fold including five males and two females. The median patient age was 68 years (range: 33 to 71 years). Total thyroidectomy was the major cause of bilateral vocal cord paralysis (4/7 patients), and Guillan-Barre syndrome, radiation-induced laryngeal stenosis, or idiopathic paralysis was observed in other patients. Tracheostomy was performed in one patient before the laterofixation of the vocal fold. The laterofixation was accomplished by two 2-0 nylon threads through thyroid cartilage. All the patients remain symptom-free after the surgery.

P-3

Endoscopic Partial Arytenoidectomy for Bilateral Vocal Fold Paralysis

Shinsuke Suzuki*

** Dept. of Otolaryngology-Head and Neck Surgery, Akita University, Akita, Japan.*

Background

Bilateral vocal fold paralysis (BVCP) causes airway obstruction, aspiration, swallowing disturbance and voice changes that significantly reduce the quality of life and can be life-threatening. Various surgical methods have been developed to solve these problems at the same time, but in recent years, endoscopic partial arytenoidectomy (EPA) has become more popular. This method can be performed through an intra-laryngeal approach, which preserves the airway and voice quality without aspiration. Herein, we report patients with bilateral vocal cord paralysis treated with endoscopic partial arytenoidectomy.

Methods

Seven patients (2 males and 5 females) with BVFP were operated on by EPA between 2010-2021 in Akita University Hospital. The median age was 67 years (range, 36-86 years). The causes of bilateral vocal cord paralysis were thyroid tumor surgery in 5 cases, aortic aneurysm rupture in 1 case, and an unknown cause in 1 case. All patients underwent a tracheotomy at their previous physician. Two patients had a history of endolaryngeal suture lateralization for bilateral vocal cord paralysis, and one of these patients underwent the same surgery three times. Surgery was performed using semiconductor lasers. The mucous membrane was preserved and fixed with fibrin glue so as to cover the excised cartilage defect.

Results

Tracheostomy closure was possible in 6 cases. The median time from surgery to tracheostomy closure was 32.5 days (range, 8–255 days). One patient without tracheostomy closure has an adequate airway but uses a speech cannula for anxiety. The median postoperative follow-up period for the 7 cases was 77.6 months (range, 5-156 months), but there were no cases of aspiration or restenosis.

Conclusion

EPA was considered to be an effective surgical method for opening the glottis for bilateral vocal cord paralysis. It may be particularly suitable for patients with restenosis after endoscopic suture latelaryzation.

P-4

Two Cases of Bilateral Recurrent Nerve Palsy Treated with Arytenoidectomy

Osamu Kawakami*, Kosuke Omote, Keiichiro Okano, Yoshiaki Kobayashi, Takuya Noda, Hiroyuki Tsuji, Morimasa Kitamura,

**Dept. of Otorhinolaryngology-Head and Neck Surgery, Kanazawa Medical University, Kahoku, Ishikawa.*

Introduction

Glottis opening surgery is performed in cases with narrow airway due to bilateral vocal cord paralysis. Among these procedures, arytenoidectomy is the most effective in preserving voice function.

We report two cases of bilateral recurrent nerve palsy in which arytenoidectomy was performed.

Case 1

A 56-year-old woman presented with bilateral recurrent nerve palsy occurring after total thyroidectomy for papillary thyroid cancer at another hospital. Preoperative MPT was 8.6 s, MFR was 500 mL/s, and GRBAS showed G2 and B2 hoarseness. There were no significant postoperative complications, postoperative MPT was 9.0 s, MFR was 280 mL/s, GRBAS was G2 and B2, and voice function was preserved. The tracheal foramen could be closed because no dyspnea was observed.

Case 2

A 39-year-old male presented with bilateral recurrent nerve palsy following total thyroidectomy at another hospital for papillary thyroid cancer. Preoperative MPT was 10 s, MFR was 230 mL/s, and GRBAS showed hoarseness of G1, R1, and B1. The preoperative FEV1.0% was 36.2%. Postoperatively, there were no significant complications, and voice function was preserved with a postoperative MPT of 8.0 s, MFR of 460 mL/s, and GRBAS of G1, R1, and B1 without significant change. Postoperative FEV1.0% was 53.8%, showing improvement. As no dyspnea was observed, the tracheal foramen was scheduled to be closed.

Discussion

Arytenoidectomy is more likely to preserve voice function than the Ejnell procedure. Yamada et al. reported six cases of bilateral vocal fold fixation in which the Ejnell method was performed, and the GRBAS-rated G was worse in all cases. In both of these cases, there was no loss of speech. However, there is a disadvantage of irreversibility and postoperative complications such as bleeding, edema, and granulation due to incision of the mucosal surface, but no complications were observed in these two cases.

Conclusion

Arytenoidectomy tends to preserve voice function better than the Ejnell procedure. It is one of the most effective techniques for patients with bilateral vocal cord paralysis.

P-5

Treatment of Unilateral Vocal Fold Paralysis by Laryngoplasty

Kazuya Kurakami*, Naoto Araki, Seiji Kakehata

**Dept. of Otolaryngology-Head and Neck Surgery, Yamagata University, Yamagata, Japan.*

Unilateral vocal fold paralysis is a frequently encountered disorder of the larynx and has a wide variety of underlying causes including aortic aneurysm, lung and esophageal cancer, stroke, and neurological disease. This paralysis can also be caused by complications after surgery such as of the thyroid, heart, aorta and mediastinum. Although spontaneous resolution of the paralysis is seen in some cases, most patients will have permanent paralysis. This paralysis can result in a hoarseness of the voice leading to a significant decline in quality of life and interference with daily activities. However, many of these patients have not been offered effective voice treatment options.

Our department believes that these patients are good candidates for voice improvement surgery, and we established an outpatient clinic specializing in voice disorders and laryngeal diseases in October 2016 to provide more targeted and specialized treatment options. Approximately 25% of new patients coming to this clinic were those with unilateral vocal fold paralysis. We began to offer all such patients laryngoplasty as a treatment option.

We subsequently tracked the 29 patients who underwent laryngoplasty over a 6-year period from October 2016 to September 2022, and all patients underwent arytenoid adduction and thyroplasty type 1 under local anesthesia. Twenty patients were followed up for more than 1 year after surgery and included in this study. The etiology of the unilateral vocal fold paralysis was thyroid surgery, lung and esophageal cancer surgery and cardiovascular and mediastinal surgery together with several cases of unknown cause. Paralysis was more common on the left side at 14 cases with 6 cases on the right side. The only serious adverse event occurred with 1 patient who underwent an emergency tracheotomy due to a temporary failure of the vocal folds to open on the healthy side postoperatively. One patient underwent a second thyroplasty type 1 for further improvement of the voice at 2 years after the first surgery. Although some patients did not see improvement in the maximum phonation time, all 20 patients showed improvement in the Voice Handicap Index after surgery.

P-6

Long-term Voice Outcomes after Arytenoid Adduction Surgery

Kenichi Watanabe*, Ai Hirano, Yuta Kobayashi, Takeshi Sato, Yohei Honkura, Yukio Katori

**Dept. of Otorhinolaryngology, Tohoku Rosai Hospital, Sendai, Japan.*

Background

Laryngeal framework surgery for patients with unilateral vocal fold paralysis (UVFP) who present with breathy hoarseness, includes thyroplasty type I (TP1) and arytenoid adduction surgery (AA). Although laryngeal framework surgery is expected to have a stable and permanent postoperative effect, there are few reports describing the long-term voice outcomes after surgery.

Purpose

The purpose of this study is to analyze the long-term postoperative effect of AA for UVFP patients and to investigate its stability and reliability.

Methods

Seventy-seven patients who had undergone AA at the Department of Otorhinolaryngology, Head and Neck Surgery, Tohoku University Hospital more than 2 years earlier were considered for the study, excluding one patient who had spontaneous recovery of vocal fold paralysis after surgery. Voice examination was performed using subjective evaluation questionnaire Voice Handicap Index (VHI). The VHI values preoperatively and approximately 3 months postoperatively (early postoperative evaluation) in the medical record were retrospectively tabulated. In addition, the VHI values more than 2 years after surgery (late postoperative evaluation) were measured by mailing a sheet to the patients and asking them to fill and return it.

Results

The return rate was approximately 60%. Twelve patients were excluded, due to the death or terminal illness. Thirty-four patients were compared between the early and late postoperative evaluation. The median age of the patients was 67.0 years; 29 were men and 5 were women. The affected side was left for 27 and right for 7; surgery of thoracic aortic aneurysm was the most frequent cause; combined with TP1 in 97.1%; four surgeons were involved. In the result, the median VHI did not differ significantly between the early and late postoperative evaluation.

Conclusion

This study shows a stable and lasting voice improvement after AA for UVFP patients over the years.

P-7

Postoperative Outcomes of Autologous Fat Injection Laryngoplasty in Unilateral Vocal Cord Paralysis

Kohei Hagiwara*, Hiroshi Hooson, Taku Yamashita

**Dept. of Otolaryngology-Head and Neck Surgery, Kitasato University, Tokyo, Japan.*

Background

Unilateral vocal cord paralysis (UVCP) is generally treated with various surgical operations. Autologous fat injection laryngoplasty (FIL) is a safe treatment option for patients with UVCP. We use buccal fat from the oral cavity because it is easier and safer to harvest.

Aim: To analyze outcomes following FIL in patients with UVCP

Design and methods

Prospective study of consecutive patients undergoing FIL for UVFP between 2016 and 2022 with at least 6 months of follow-up. Before and 6 months after surgery, maximum phonation time (MPT) mean flow rate (MFR) voice handicap index (VHI) scores, and G scale of the GRABS scale were compared to assess the impact of FIL on these outcomes.

Results

26 patients (mean age 59 years old; range, 29–77 years old) were enrolled in this study. 19 patients had paralysis in the left vocal cord and the other 7 in the right vocal cord. Of these 26 patients, 17 (65%) showed postoperative paralysis; after thyroid surgery in 11 patients, after aortic aneurysm surgery in 3 patients, after mediastinal surgery in 2 patients, and maxillofacial surgery in 1 patient. The other causes of the paralysis were: Aortic aneurysm in 4 patients, idiopathic in 4 patients, and esophageal cancer in 1 patient. The amount of injected buccal fat was 1.05 ml on average (min. 0.5ml, max. 1.9ml). The mean for MPT was 4.7 and 11.8 s before and after surgeries, respectively ($p < 0.01$). The mean for MFR was 768 and 395 mL/sec before and after surgeries, respectively ($p < 0.01$). The mean for VHI was 66.9 and 24.0 before and after surgeries, respectively ($p < 0.01$). The mean for G score was 2.6 and 1.5 before and after surgeries, respectively ($p < 0.01$). In summary, all scores improved significantly 6 months after surgery compared with preoperative voice examination findings.

Conclusions

FIL for UVCP improves vocal performance.

P-8

Fibroblast Growth Factor Injection for Unilateral Vocal Fold Paralysis: Long-term Results and Safety

Tomohiko Yamauchi*, Tomohiro Hasegawa, Kazuya Kurakami, Ujimoto Konomi, Mayu Hirosaki, Daigo Komazawa, Miki Nozawa, Yusuke Watanabe, Takeharu Kanazawa

**Dept. of Otolaryngology, Jichi Medical University, Shimotsuke, Japan.*

Objectives

Treatments for unilateral vocal fold paralysis (UVFP) include conservative voice rehabilitation, vocal fold injection, and laryngeal framework surgery. We proposed basic fibroblast growth factor (bFGF) injection as a potential novel treatment for UVFP and have reported the short-term results. In this study, we present the long-term results and safety of vocal fold bFGF injection as a treatment for UVFP.

Methods

This retrospective study included 42 patients (25 males and 17 females) with UVFP who were administered a local injection of bFGF. The injection regimen involved injecting FGF (0.5 μg/mL in 0.5 mL per side) into the bilateral vocal folds using a 23-gauge injection needle. Phonological outcomes were evaluated 6 months and 12 months after the injection.

Results

Overall, 26 patients received a single injection of bFGF, six patients received an additional injection, and 10 patients received the additional framework surgery. Maximum phonation time, mean flow rate, pitch range, jitter and shimmer percentages, the total GRBAS (grade, roughness, breathiness, asthenia, strain) score, and voice handicap index scores improved significantly in the long term. In patients who received the additional injection or framework surgery, the effects of bFGF injection were temporary, but did not interfere with the performance of the framework surgery.

Conclusion

In total, 42 patients who underwent vocal fold bFGF injections were reviewed. The bFGF injections were effective and safe in the long term results for UVFP in the selected cases. Some patients with severe symptoms benefited from the additional framework surgery but not the additional bFGF injection.

P-9

Changes in Serum Basic Fibroblast Growth Factor Concentration Following Intracordal Injection

Tomohiro Hasegawa*, Daigo Komazawa Ujimoto Konomi, Mayu Hirosaki, Yusuke Watanabe.
**Tokyo Voice Center, International University of Health and Welfare, Tokyo, Japan.*

Objective

Although many studies have reported improvements in voice outcomes with intracordal trafermin injection, there is a lack of data documenting its changes in serum basic fibroblast growth factor (bFGF) blood concentration. This study examined whether serum bFGF concentrations change after intracordal trafermin injection.

Methods

This retrospective study was conducted at Tokyo Voice Center. We investigated serum bFGF concentrations before and after injection in 40 patients who underwent intracordal trafermin injection. There were 26 males and 14 females, with an age ranging from 13 to 88 years (average 53.25 years). They were diagnosed with paralysis (15 patients), atrophy (15 patients), sulcus (8 patients), and others (2 patients: scar and functional), presenting with severe hoarseness that interfered with daily life.

Results

The mean pre- and post-injective serum bFGF concentration of the 40 patients was 6.689 and 4.658 pg/mL, respectively. The difference in mean serum bFGF concentration between pre- and post-injective was −2.031 pg/mL. The Pearson correlation coefficient was calculated to evaluate the correlation between dosage of trafermin and post-injective serum bFGF concentration, and a moderate correlation was found at r = 0.52. Generalized linear model regression analysis was performed for the purpose of adjusting for confounding among variables. The only variable that showed a statistically predominant association with post-injective serum bFGF concentrations was the dosage of trafermin, with an estimated regression coefficient of 0.048.

Conclusion

In this study, the dosage of trafermin we injected and post-injective serum bFGF concentrations were dose-dependent but the amount of changes in the serum bFGF concentration was negligible within the physiological range. Therefore, as with subcutaneous and wound administration, intracordal trafermin injections may be safe.

P-10

Clinical Usefulness of Korean Items for the Differential Diagnosis of Adductor Spasmodic Dysphonia

Jae-Seon Park*, Sang-Hyuk Lee, Sung-Min Jin

**Dept. Otolaryngology-Head and Neck Surgery, Sungkyunkwan University, Seoul, Korea.*

Adductor spasmodic dysphonia (ADSD) is a disease in which symptoms such as voice break, strained voice, and voice tremor occur during vocalization due to abnormal spasm of the adductor muscles of the vocal cords. Speech task specificity, in which voice symptoms are alleviated during physiological phonation, voiceless or continuous vowel utterance, and worsened during a voiced utterance, are known as voice characteristics of ADSD. In this study, we tried to confirm the clinical effectiveness of recently developed Korean items for the differential diagnosis of ADSD and muscle tension dysphonia (MTD).

In this study, 20 patients who were diagnosed with ADSD and improved with treatment at Kangbuk Samsung Hospital were set as the ADSD group, 7 patients diagnosed with MTD and received voice therapy as the MTD group, and 7 normal patients without voice disorders were set as the control group, and the medical records and voice test results were compared and analyzed. Recently developed Korean questions were read by the patient, and the degree of voice tremor, strained voice was evaluated. In addition, the recorded voice was analyzed with a spectrogram, and the degree of abrupt voice breaks, irregular wide-spaced vertical striations, well-defined formants, and high-frequency spectral noise was evaluated. Additional evaluation was conducted using the MDVP and the VHI. The collected data were subjected to statistical analysis using the SPSS program.

As a result of comparing the data of the ADSD group and the MTD group, a statistically significant difference between the two patient groups was confirmed in the auditory perceptual evaluation of voiced sentences and phrases, tense voiceless sentences and phrases of Korean items ($p < 0.05$). As a result of the spectrogram analysis, voice breaks were observed more frequently in the ADSD group during speech of voiced sentences, and wide-spaced vertical striations were more prominently observed in ADSD group during speech of voiced sentences and phrases, and tense voiceless phrases ($p < 0.05$).

In conclusion, it was confirmed that Korean items for the differential diagnosis of ADSD are useful in identifying speech task specificities in ADSD patients through spectrogram analysis as well as auditory perceptual evaluation.

P-11

Botulinum Toxin Injection by Thyrohyoid Approach Using a Double-bent 60mm Cathelin Needle for Adductor Spasmodic Dysphonia

Hironori Baba*, Genki Iwai, Arata Horii

** Dept. Otolaryngology-Head and Neck Surgery, Niigata University, Niigata, Japan.*

Introduction

Botulinum toxin treatment for adductor spasmodic dysphonia was covered by insurance in Japan in 2018. Laryngeal injection methods include oral and intranasal injection. Amin also reported the thyrohyoid approach (THA) in 2006, which was ineffective in 13% of patients. We are injecting the botulinum toxin using the THA, for which we use a double-bent 60mm cathelin needle as reported by Toyomura. We report the results of this study.

Subjects

Eighteen patients with adductor spasmodic dysphonia who underwent botulinum toxin injection via thyrohyoid between January 2020 and December 2022.

Methods

Anesthesia methods were nebulized 4% lidocaine for 5 minutes and dispersed 4% lidocaine in the laryngopharynx using endoscope with a forceps port. The injection needle was a 23G, 60mm cathelin needle. The tip of the needle was bent at 45°in two places, and the needle was inserted into the larynx using the THA. The tip of the needle was checked by laryngoscope, and botulinum toxin was injected into the thyroarytenoid muscle.

Results

Mean age was 40.1 years (median 37.5 years), male to female ratio 3:15; VHI showed significant improvement, and 2 patients remained unchanged.

Discussion

Botulinum toxin injected using the THA can be injected reliably because the needle tip can be confirmed by laryngoscopy. The needle tip emerges from the mucosa near the vocal cords, so the left-right swing is small, and stable injection is possible. It also has the advantage of low running costs. The department also applies collagen and steroid injections.

P-12

Randomized, Double-blinded Clinical Trial of BotulinumTtoxin Therapy for Spasmodic Dysphonia in Japan

Suguru Maeda*, Masamitsu Hyodo, Kahori Hirose, Maya Nakahira, Nao Doi

**Dept. of Otolaryngology-Head and Neck surgery, Kochi University, Nankoku, Japan.*

Background

Botulinum toxin (BT) injection into the laryngeal muscles has been a standard treatment for spasmodic dysphonia (SD). However, few high-quality clinical studies have appeared and BT has been used off-label in most countries. To overcome this clinical issue, we performed a multicenter, placebo-controlled, randomized, double-blinded parallel-group comparison/open-label clinical trial to obtain approval for BT (Botox®) therapy in Japan.

Methods

Twenty-four patients (22 with adductor SD and 2 with abductor SD) were enrolled. The primary endpoint was the change in the number of aberrant morae (phonemes) at 4 weeks after drug injection. The secondary endpoints included the change in the number of aberrant morae, GRBAS scale, Voice Handicap Index (VHI) and visual analogue scale (VAS) over the entire study period.

Results

In the adductor SD group, the number of aberrant morae at 4 weeks after injection reduced by 7.0 ± 2.30 (mean ± SE) in the BT group and 0.2 ± 0.46 in the placebo group ($p=0.0148$). The improvement persisted for 12 weeks following BT injections. The strain element in GRBAS scale significantly reduced at 2 weeks after BT treatment. The VHI and VAS scores as subjective parameters also improved. In the abductor SD group, one patient responded to treatment. Adverse events included breathy hoarseness (77.3%) and aspiration when drinking (40.9%) but were mild and resolved in 4 weeks.

Conclusions

This study showed that BT injection was safe and efficacious for the treatment of SD. Based on these results, BT injection therapy was formally approved as an SD treatment in Japan. Today, it is available at more than 60 hospitals and clinics all over Japan, greatly benefiting patients.

P-13

Evaluation of the Therapeutic Effects of Botulinum Toxin Injection According to the Diagnostic Criteria and Severity Classification of Spasmodic Dysphonia

Masaki Hatano*, Mayu Hirosaki, Tomohiro Hasegawa, Reo Horie, Daigo Komazawa, Kazuhiro Nakamura, Yukio Katori, Yusuke Watanabe

**Tokyo Voice Center, International University of Health and welfare, Tokyo, Japan.*

Background.

In Japan, diagnostic criteria for spasmodic dysphonia (hereafter referred to as SD) were published in 2018, and botulinum toxin injection (hereafter referred to as BT injection) for SD was covered by insurance. In this study, we compared the treatment efficacy of BT injection in definite, probable, and not SD cases of adduction-type SD (hereafter referred to as AdSD) and by severity, based on the diagnostic criteria and severity classification.

Methods.

We retrospectively reviewed patients who visited our department and underwent BT injection for suspected AdSD from 2018 to 2022.

Results.

There were 76 cases of initial injection (15 males, mean age 44 years), and after excluding cases with missing data, there were 39 definite cases (19 severe, 19 moderate, 1 mild), 7 probable cases (3 severe, 4 moderate, 0 mild), and 17 not SD cases (8 severe, 8 moderate, 1 mild). Ten of the not SD cases had an obvious psychogenic cause before onset, 4 had symptoms lasting less than 6 months, and 3 had essential voice tremor.

VHI improved postoperatively: definite/severe: 36.4, definite/moderate: 21.7, not SD/severe: 31 not SD/moderate: 15.5.

Conclusion.

VHI improved with BT infusion even in not SD cases. The more severe the disease, the more VHI tended to improve.

P-14

A Case of Salvage Total Laryngectomy and Mediastinal Tracheostomy in a Patient with Recurred Glottic Cancer

Yongil Cheon*, Byung-Joo Lee,

**Pusan National University Hospital, Busan, Korea.*

A 72-year-old man presented with recurred glottic cancer visited our hospital. He was diagnosed with glottic cancer 30 years ago and received radiotherapy for recurrence after vertical hemilaryngectomy. When evaluated, cancer recurred at the tracheocutaneous fistula site. We report a case of salvage total laryngectomy, mediastinal tracheostomy and reconstruction of pectoralis major musculocutaenous flap in the recurred glottic cancer patient.

P-15

Clinical Experiences of Tracheoesophageal Puncture with Voice Prostheis in Single Medical Facility

Chien-Jen Chiu*, Yung-An Tsou, Tzu-Chieh Lin

**Dept. of Otolaryngology-Head and Neck Surgery, China medical university hospital, Taichung, Taiwan.*

Voice restoration in laryngectomees is an important issue that affects their communication, employment, interpersonal relationship, emotion, etc. Tracheoesophageal puncture with voice prosthesis implantation as one of the methods to help laryngectomees regain their voice is still chosen by some patients although some drawbacks disturb use experience.

Leakage is the most common complication when we apply such tool help patients clinically. Sometimes it can be managed conservatively. But it is inevitably to replace with new voice prosthesis if failed to manage conservatively. We also recorded all kinds of complication we have encountered clinically. Episodes of developing dysphagia, stoma stenosis, prosthesis dislodgement, leakage with choking were all recorded. We also compare the voice outcome of tracheoesophageal voice prosthesis with pneumonic voice prosthesis which has been used most frequently in Taiwan currently. Although patients encounter some complication during their daily life using, they are still willing to use it continually. Tracheoesophageal voice prosthesis is valuable in voice restoration for laryngectomees. And it is worthwhile to keep developing new generation of prosthesis and solutions to lower complications.

P-16

A Case of Difficult-to-treat Hoarseness after Laryngeal Trauma

Sumie Takashima*, Shuntaro Soejima, Yoko Hara, Junki Ohno, Koutaro Maeda, Hideaki Nishi, Yoshihiko Kumai

**Dept. of Otolaryngology-Head and Neck Surgery, Nagasaki University, Nagasaki, Japan.*

The case is a 27-year-old male. While riding a motorcycle, he collided with a right-turning truck coming from the front and hit his neck and chest. Immediately after the injury, despite of no disturbance of consciousness was observed, however, he was unable to speak. At that time, an imaging study (Computed Tomography) of the neck revealed bilateral pneumothorax, trachea deviation to the right side, and airway narrowing due to deviation of the arytenoid cartilage and deformation of the cricoid cartilage. At first, since oral intubation was not succeeded, trachea puncture was performed, however, sufficient ventilation was not achieved. Therefore, oral intubation was finally performed under endoscopic guidance. Two days after the injury, tracheotomy was performed with careful observation that the cricoid cartilage was fractured circumferentially and the anterior wall was deviated anteriorly, requiring reduction. On the other hand, no obvious damage to the laryngeal lumen, such as vocal fold rupture, was observed.

It took about 2 months for the edema of the vocal folds to disappear, and the tracheocutaneous fistula, which was created for the management of wound infection, could be closed 3 months after the injury. Before the tracheocutaneous fistula was closed, left vocal fold paresis and laryngeal granuloma were observed at posterior. The result of voice rating scale was G3R1B3A0S0 as severe breathy hoarseness. On the other hand, after the tracheocutaneous fistula was closed, he presented with G2R2B0A0S0 as rough hoarseness, additionally, the left laryngeal granuloma disappeared, vocalization with false vocal fold due to scarring, which had not been observed before closure. At this point, voice therapy was initiated, resulting in improvement to G1R1B0A0S0. However, he still had a hoarse voice when he spoke loudly. Since he wanted to become a police officer, he strongly hoped for further improvements in his voice. Therefore, thyroid-plasty type I was performed and the voice volume was increased.

Through our experience of this case, we were reminded once again that not only securing the airway as an initial treatment for laryngeal trauma, but also long-term, continuous and meticulous treatment as phonosurgery and voice therapy afterward are quite significant.

P-17

Surgical Management for Obsolete Cricoid Fracture Following Blunt Trauma

Yosuke Nakanishi*

**Dept. of Otolaryngology-Head and Neck Surgery, Kanazawa University, Kahoku, Ishikawa.*

Laryngeal fractures that affect laryngeal function can threaten not only quality of life, but life itself. In a recent series of patients with laryngeal trauma, displaced cartilaginous fractures usually required excision and reconstruction of the laryngotracheal anatomy with an open approach, and tracheostomy for rehabilitation of laryngeal function relating to the airway, voice, or swallowing. The aim of the reconstruction is to achieve stability of laryngeal skeleton and an intact epithelial lining to preserve the sphincteric, airway, and phonatory function of the larynx. Most reports recommended early exploration and reconstruction of laryngeal cartilage frame within 24hour. Few studies have been reported about the obsolete cricoid fracture. We show the case of surgical management for obsolete cricoid fracture.

A 22-year-old male had aphonia and dysphagia. He was punched to the right side of the anterior neck during the boxing game. His voice quality was scored as G3R0B3A0S1 using the grade-roughness-breathiness-asthenicity-strain system. His maximum phonation time was 2 seconds. Laryngeal fiberoptic examination revealed immobility of the right vocal cord and glottic insufficiency. CT scan showed displaced fractures of the bilateral anterior arch and the middle posterior lamina of the cricoid cartilage. One hundred and one days after trauma, he underwent surgical reduction with general anesthesia in our department. After general anesthesia, a cervical incision made following a horizontal skin crease at the level of the cricothyroid membrane. After elevation of the subplatysmal flap to expose the strap muscles over the cricothyroid membrane and muscles, displacements of the cricoid arch with concrescence were observed. We were unable to reduce the cricoid fracture due to sclelosis. About three millimeter of cricoid cartilage was resected in the midline. After reduction of the cricoid fracture, the cricoid cartilage was sutured. One month later, the suture was removed. Although the quality of the patient’s voice improved, his hoarseness still persists.

P-18

Two Cases of Arytenoid Dislocation; Different Treatment Approaches

Naoki Takemoto*, Tetsuji Sanuki

**Dept. of Otolaryngology, Head and Neck Surgery, Nagoya City University, Nagoya, Japan.*

Arytenoid dislocation is a rare disease triggered by external forces such as a traumatic injury, an intubation, and an endoscope. It is difficult to differentiate from recurrent nerve palsy, and is often misdiagnosed. The primary treatment is restoration, but there is no established opinion regarding the method or timing of restoration. We experienced two cases of arytenoid dislocation treated in a different way.

One case is a 70-year-old man who had hoarseness after gastroscopy. One month after, he was referred to our hospital that he had poor movement of left vocal fold. We diagnosed that his left vocal fold was posteriorly dislocated, and performed outpatient restoration, then the hoarseness improved.

The other case is a 76-year-old woman who developed hoarseness without any causes. She was suspected to have left recurrent nerve palsy at another hospital and was followed up. 6 months later, she was referred to our hospital, because there was no improvement. Applying the laryngeal electromyography, we diagnosed not palsy but arytenoid dislocation. Because it took a long time since the onset of dislocation, we attempted to perform a laryngoscopic restoration under general anesthesia. Because of the limited effect, we performed arytenoid adduction and thyroplasty type I additionally. Then the hoarseness improved.

This presentation will review other articles and discuss the diagnosis and treatment of arytenoid dislocation.

P-19

A Case Report of Traumatic Dislocation of the Cricothyroid Joint Successfully Treated with Laryngeal Chondroplasty Type IV

Yoshihiro Iwata*, Kaori Muto, Tomoki Kuki, Hisayuki Kato, Ichiro Tateya

**Dept. of Otolaryngology, Head and Neck Surgery, Fujita Health University, Toyoake, Korea.*

Thyroid chondroplasty type IV is known as a method of applying tension to the paralyzed vocal cords and is applied as a means of altering the pitch of the voice. Its effectiveness as a single procedure is often sound inadequate. We report the results of this surgical procedure, which include suggestions for implementation.

The case is a 40-year-old male. After being struck on the neck, he became aware of discomfort during speech and an abnormality in the loudness of his voice.

Since there was no improvement, he consulted a physician. He complained of difficulty in continuing to speak or in producing a loud voice. No abnormality was found in vocal fold movement. The left vocal fold membranous area was found to be hypotonic and shortened in length.

CT showed asymmetry in the position of the cricoid cartilage and thyroid cartilage. Palpation revealed tenderness behind the inferior border of the left thyroid cartilage. When the cricoid cartilage arch and thyroid cartilage were placed close to each other in the midline, dysphonia and difficulty in speaking were reduced.

Thyroid chondroplasty type I was performed, but it did not improve her voice sufficiently.

An additional Type IV surgery was performed to pull the cricoid cartilage posterior to the thyroid cartilage.

As a result, sufficient improvement of voice was achieved. (MPT preOP 16 sec, postOP 32 sec)

P-20

A Case of Recurrent Laryngeal Granuloma Treated with Intralesional Steroid Injection.

Ai Hirano*, Yasutoshi Koshiba, Yuto Kobayashi, Takuma Hisaoka, Yukio Katori

**Dept. of Otolaryngology-Head and Neck Surgery, Tohoku University Graduate School of Medicine, Sendai, Japan.*

Background:

Recurrent laryngeal contact granulomas often recur after surgical treatment, and in Japan, conservative treatment such as voice training, oral proton pump inhibitors, glucocorticoid nebulizer inhalation, is recommended. On the other hand, there have been reports that botulinum toxin injections into the vocal folds and intralesional steroid injections have been effective. We report here a case of recurrent laryngeal granuloma that was treated effectively with oral intralesional steroid injection.

Case summary:

The patient was a 48-year-old salesman. He was referred to our department for treatment of recurrent laryngeal granuloma, which had recurred one month after surgery. He had a large granuloma behind the right vocal cord, and despite lifestyle guidance, voice training, and oral steroids, there was no improvement. A total of 6 intralesional steroid injections were performed orally every 4 weeks, and the lesion was markedly reduced, and the patient is currently under observation.

Conclusion:

Intralesional steroid injection may be an effective treatment option for refractory recurrent laryngeal granuloma.

P-21

Office Based Fiberscopy May Overlook the Neonatal Dysphonia

Chia-Der Lin*, Kuo-Sheng Lee,

**Dept. of Otolaryngology-Head and Neck Surgery, China Medical University & Hospital, Taichung, Taiwan.*

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The most common symptoms of infants in pediatric ENT department are cough, stridor, hoarseness, and shortness of breath, with or without fever. They are often diagnosed as having common illnesses such as laryngitis, bronchopneumonia, or laryngomalacia. However, when an infant has a history of persistent hoarseness after birth, some unusual causes should be considered. Congenital laryngeal web is one of the rare congenital causes of congenital dysphonia and even stridor. The child's age and medical history are critical to the diagnosis of this disease. In this report, we present a case of a 25-month-old girl who was suffered from weak crying, and hoarseness after birth. Officed based laryngoscopy was ever studied but no difinite diagnosis was made. Because of the persistence of symptoms, further detailed laryngoscopic examination was performed under sedation, which revealed a congenital laryngela web. The voice problem got imporved after the diagnossis of congenital laryngeal web and laryngeal web separation. Detailed laryngoscopic examination should be performed in any infants with dysphonia.

P-22

Analysis of Speech Fundamental Frequencies for Different Tasks in Japanese

Taisuke Sotome*, Ujimoto Konomi, Yusuke Watanabe, Naoshi Maeara, Junichi Fukaura, Takeharu Kanazawa

**Department of Otolaryngology-Head and Neck Surgery Jichi Medical University, Shimotsuke, Japan.*

Purpose

Speech fundamental frequency (SFF) assessment is essential for all dysphonia patients to effectively evaluate the therapeutic effects of voice therapy, especially in patients with disturbances in their voice pitch. A standard method of SFF measurement remains unknown. Speech tasks such as sustained vowel phonation, counting, reading passage, and spontaneous speech have generally been used for SFF measurements. Ideally, spontaneous speech best reflects SFF; however, this task has not yet been clearly defined and is limited with regard to its adaptation to a clinical setting. A reliable task for SFF measurement in Japanese, which corresponds to a speech task that most closely reflects the value that would be observed with typical spontaneous speech, has not been investigated. This study aimed to identify a reliable speech task by measuring the SFF values elicited by different widely used speech tasks in Japanese, and assess its reliability and coefficient of determination (R2).

Methods

Sixty healthy volunteers were enrolled. All experimental procedures were performed in Japanese. The SFF values for the speech tasks were determined through the voice samples recorded using a Pulse Code Modulation (PCM) recorder. Each task, except spontaneous speech, was repeated five times, and the average fundamental frequency in each task was determined as the SFF. To assess the reliability of the SFF values across daily variations within individual speakers, the SFF measurements were repeated on two different days, separated by at least 1 week.

Results

The SFF values of sustained /a/ phonation, sustained vowel-average, counting, reading passage, and spontaneous speech had excellent reliability, in terms of their reproduction based on intraclass correlation. Significantly high SFF values were observed, in decreasing order, for sustained vowels-average, counting, reading passage, and spontaneous speech in both males and females. The highest R2 for spontaneous speech was that of reading passage in both males (R2 = 0.771) and females (R2 = 0.806) ($P < 0.01$).

Conclusion

When spontaneous speech was presented as a task most reflective of daily conversation, reading passage was determined to be the reliable task to assess the therapeutic effect of voice therapy in Japanese.

P-23

Effectiveness of Voice Therapy in Patients with Mutational Falsetto

Wei-Qian Qiu*, Yi-Hsuan Lo, Chen-Chi Wang

**Taichung Veterans General Hospital, Taichung, Taiwan.*

Objective

The study aimed to evaluate the effectiveness of voice therapy in patients with mutational falsetto by analyzing the voice quality pre- and post- voice therapy.

Methods

Five patients with mutational falsetto aging from 14 to 30 years old were included in this study. Voice assessment including acoustic analysis [fundamental frequency (F0), jitter, shimmer, and Noise to Harmonic Ratio (NHR)], aerodynamic analysis [maximum phonation time (MPT) and mean airflow rate], perceptual observation [the Grade, Roughness, Breathiness, Asthenia, and Strain (GRBAS) scale] and self-rating questionnaire [Voice Handicap Index (VHI-10)] was performed before and after voice therapy.

Results

F0 was significantly decreased in all five patients after voice therapy. Other acoustic parameters, including jitter, shimmer, and NHR were also decreased. MPT was longer after voice therapy, while mean airflow rate was lowered. Improvements in GRBAS scale was also noticed in all five participants. Furthermore, mean score of VHI-10 was 23.4 (severity: severe) before voice therapy, and was decreased to 10.4 (severity: mild) after voice therapy. Conclusion: Voice therapy is effective and efficient in decreasing F0 to patients with mutational falsetto. During voice therapy sessions, acoustic and aerodynamic analysis can provide objective information and valuate therapeutic effects, and by rating GRBAS scale, clinicians are able to give immediate feedback of patients' voice quality. Decrease of score of VHI-10 indicates better voice-related quality of life of the patients after voice therapy.

Key words: Mutational falsetto, Voice therapy, Fundamental frequency

P-24

Effects of Laryngeal Massage on Voice Recovery after Thyroid Surgery

Ji Won Kim*

**Dept. of Otolaryngology-Head and Neck Surgery, Inha University College of Medicine, Incheon, Korea.*

Background

Neck discomfort and voice change after thyroidectomy might be occur without nerve injury. A postoperative laryngeal massage can reduce adhesions at the surgical site by increasing blood flow, thereby improving the extensibility of the neck and quality of voice. We aim to evaluate the short and long term effects of laryngeal massage on voice change after conventional and robotic thyroidectomy.

Methods

A total of 114 patients who underwent thyroidectomy were included (62 in the conventional thyroidectomy group and 52 in robotic thyroidectomy group). Laryngeal massage was used as an intervention to release surgical adhesion. After wound massage education, participants were recommended laryngeal massage from 1 to 9 months after thyroidectomy. Patients were divided to two groups according to compliance (active vs no massage group). We assessed the change with stroboscopic examination, aerodynamic assessment, acoustic analysis, and twenty items of the thyroidectomy-related voice symptom questionnaire (TVSQ) at baseline and 1 to 9 months after thyroidectomy

Results

The active laryngeal massage group had significantly better recovery from voice change score, and throat discomfort score compared with passive laryngeal massage group at 9 months after thyroidectomy. there was no significant difference in those parameters among two groups at 1 month after thyroidectomy. Voice analysis results associated with laryngeal movement (speaking fundamental frequency, voice range profile maximum, voice range profile range) also indicated significant recovery in the active laryngeal massage group.

Conclusion

The laryngeal massage could help patients recover from throat discomfort and voice changes after thyroidectomy.

P-25

The Classification of Laryngeal Benign Disease by Analyzing Continuous Speech Using Artificial Intelligence

Young Ju Jin*, Jungirl SEOK, Tack-Kyun KWON,
**Kangwon National University, Chuncheon, Japan.*

Background

Recording the sound "ah" is a commonly used method to diagnose speech disorders or abnormalities in the vocal cords. However, analyzing single vowel sounds that do not reflect various pitch, intensity, and timbre has the drawback of difficulty in understanding all aspects of voice disorders. Conversely, continuous speech can reveal various symptoms of voice disorders and patient discomfort, but there has been a limitation in clinical use due to the problem of inability to quantify it. We hypothesized that the latest artificial intelligence technology could be used to overcome these limitations.

Method

We collected data from 100 patients each with vocal polyps, nodules, and cysts, typical causes of vocal cord benign lesions, and 300 normal individuals who showed normal findings on laryngoscopy before and after thyroid surgery. We used the recorded voice files of reading the sentence "summer" and the sound "ah". Each voice data was analyzed using mel-spectrogram transformed images. For sentence reading, we used time-series CNN algorithms, and for single vowel sound analysis, we used conventional CNN.

Results

The time-series CNN algorithms for sentence reading showed AUCs of 0.78~0.79, and the single vowel sound "ah" showed an AUC of 0.80.

Discussion:

Vocal cord benign lesions may not show the characteristics of the disease through single vowel sounds when the severity of the disease is not severe, and may only be revealed intermittently or through stress during conversation. Therefore, if analysis through sentence reading is possible, it is expected to have a wider range of applications than single vowel sound analysis. In this study, both methods showed similar AUCs, but it is believed that the single vowel sound analysis showed a higher result in terms of algorithm technique because data augmentation was easier. On the other hand, for sentence reading analysis, it is expected to show higher accuracy through appropriate algorithm improvement.

P-26

Recognizing Edge-Based Diseases of Vocal Cords by Using Convolutional Neural Networks

Pei-Ju Chiu*, Yung-An Tsou,

**China Medical University Hospital, Taichung, Taiwan.*

During clinical consultations and case training, doctors analyze numerous images and sounds. A high-pressure consultation environment can increase the probability of a doctor making incorrect inferences regarding vocal cord (VC) disease. Therefore, this study applied deep learning to design an edge-based VC disease detection system (EVC-DD) for common VC conditions (e.g., nodules, polyps, and cancer) to assist doctors in conducting consultations and case studies and in verifying the consistency of their disease inferences. Through deep learning, the model extracted and recorded clinically confirmed information in its disease inference model. The experiment data set comprised videos of nodules, polyps, and cancer that were used to evaluate the performance of the proposed model. From 13 cases confirmed by two doctors, 1740 images were extracted from 13 case videos and used in the experiment. In total, 1044 (60%), 348 (20%), and 348 (20%) images were randomly obtained through five-fold cross-validation for training, validation, and testing, respectively. During the model training process, the EVC-DD model achieved 100% accuracy in detecting the three conditions required for optimal experiment results. For the results in the analysis of the independent test data with optimized configuration. the EVC-DD model achieved 99.42%, 99.42%, 99.42%, 99.42%, 98.91%, and 0.9957 for averaged F1 score, averaged recall rate, averaged precision, accuracy, Matthews correlation coefficient, and area under the curve, respectively. The EVC-DD model required only 400 s to complete its training using 1740 images. The results indicate that the inferences of the EVC-DD model were highly consistent with the results of the clinical examination by doctors and that its training was data- and time-efficient, thereby allowing the model to learn new cases quickly. Thus, the EVC-DD model can assist doctors in consultations and case analyses by providing reliable disease inferences and real-time input regarding new case knowledge.

P-27

Respiratory Epithelial Regeneration through Stepwise Differentiation of Human Tonsil-Derived Mesenchymal Stem Cells

Soo Yeon Jung*

** Ewha Womans University, Seoul, Korea.*

Background

Airway defects are commonly caused by tumor invasion or acute trauma. Morphological reconstruction is not that challenging; however, functional reconstruction of epithelium, which should have cilia and mucus secretion functions, is difficult. Here, we developed an alternative for respiratory epithelial regeneration by using human tonsil-derived mesenchymal stem cells (TMSCs) to induce epithelial cells through stepwise differentiation.

Materials and Methods

TMSCs were isolated from human tonsillar tissue of patients undergoing tonsillectomy and differentiated into airway epithelial cells following the human embryonic developmental process. To generate airway epithelial cells, TMSCs were exposed to various chemical agents or protein combinations during four steps.

Results

We found that TMSCs can be induced into the definitive endoderm with a low concentration of activin A, which is an activator of the Nodal/TFG-b signaling pathway. Next, a combination of growth factors regulating BMP, TGF-b, and WNT signaling induced the differentiation of DE-induced TMSCs into anterior foregut endoderm, identified by upregulating gene expression of PAX7, SOX2, and GATA3. An environment rich in BMPs, WNT, and FGFs differentiated TMSCs into lung progenitor cells, as evidenced by increased gene expression of NKX2-1, an early lung progenitor marker. In the final step, the expression of Keratin 5, a basal cell marker, and FOXJ1, a ciliated cell marker, were increased in TMSC-derived airway epithelial cells generated through air-liquid interface culture.

Conclusion

Our results demonstrated that TMSC-derived airway epithelial cells can be generated by stepwise differentiation and represent a potential alternative for treating functional recovery of respiratory defects.