THE PROGRAM
OF
THE NINETY SEVENTH ANNUAL MEETING
OF
The American Broncho-Esophagological Association

Wednesday, Thursday, and Friday
April 26-28, 2017
Manchester Grand Hyatt
San Diego, California
The Laryngoscope is the official journal of ABEA

The Laryngoscope has been the leading source of information on advances in the diagnosis and treatment of head and neck disorders for nearly 120 years. The Laryngoscope is the first choice among otolaryngologists for publication of their important findings and techniques. Each monthly issue of The Laryngoscope features peer-reviewed medical, clinical, and research contributions in general otolaryngology, allergy/rhinology, otology/neurotology, laryngology/bronchoesophagology, head and neck surgery, sleep medicine, pediatric otolaryngology, facial plastics and reconstructive surgery, oncology, and communicative disorders. Contributions include papers and posters presented at the Annual and Section Meetings of the Triological Society, as well as independent papers, "How I Do It", "Triological Best Practice" articles, and contemporary reviews. Theses authored by the Triological Society's new Fellows as well as papers presented at meetings of the American Laryngological Association and American Broncho-Esophagological Association are published in The Laryngoscope.
Purpose
The purpose of this program is to provide Otolaryngologists-Head and Neck Surgeons, Pulmonologists, Gastroenterologists and other interested physicians, clinicians and scientists with an opportunity to update their knowledge of diseases involving the upper aerodigestive tract.

Educational Objectives
The aim of these scientific sessions is to provide physicians with up-to-date information pertinent to the clinical evaluation and endoscopic management of laryngeal, tracheobronchial, and esophageal disorders.

This scientific program will provide attendees with an advanced understanding of current issues regarding the diagnosis and management of complex swallowing disorders, voice disorders, airway disorders and operative procedures used in the management of disorders of the upper aerodigestive tract.

Special focus will be placed on issues relevant to laryngology.

Attendees will also be receive advanced knowledge and techniques enabling them to compare and refine their medical and surgical skills to include best practice performance and optimize patient outcomes. These outcomes will also introduce them to deficits in current knowledge and future research needs.

Disclosure
In compliance with the ACCME Accreditation Criteria, the American College of Surgeons, as the accredited provider of this activity, must ensure that anyone in a position to control the content of the educational activity has disclosed all relevant financial relationships with any commercial interest. All reported conflicts are managed by a designated official to ensure a bias-free presentation. Please see the insert to this program for the complete disclosure list.
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## Wednesday, April 26, 2017
### Agenda At A Glance

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<th>Time</th>
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| 1:00 PM - 1:30 PM | Business Meeting and Voting on New Members  

*MEMBERS ONLY*

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| 1:30 PM - 1:45 PM | Presidential Welcome  

Introduction of Guests, Presidential Citations and Program |

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<td>Adjourn with Presidential Close</td>
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Presidential Welcome

Dana M. Thompson, MD
Presidential Citations

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Michael Rutter, MD
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Presidential Keynote Address

Celebrating 100 Years of the ABEA: Disruptive Innovation/Diversity and Inclusion

Dana M. Thompson, MD
SESSION I:

Esophageal Diseases

Moderators:
Nicholas LaRusso, MD
Gregory Postma, MD
EFFECT OF BODY POSITION ON PHARYNGEAL SWALLOWING PRESSURES EVALUATED WITH HIGH-RESOLUTION MANOMETRY

Authors: Sarah P Rosen, Corinne A Jones, Suzan M Abdelhalim, Timothy M McCulloch

Institution: University of Wisconsin-Madison

Presenter: Sarah Rosen

Objective: The effect of body position and gravitational pull on the complex pressure-driven process of pharyngeal swallowing remains unknown. Using high-resolution manometry (HRM), this study aims to identify positional adaptations of pharyngeal physiology by evaluating swallowing pressure patterns in a series of inverted body positions.

Method: Ten healthy adults (20-51 years) each underwent swallowing tasks with pharyngeal HRM at six body positions using an inversion table (0° (upright), 45°, 90° (supine), 110°, 135°, and 180° (fully inverted)). Repeated measures ANOVA was used to assess impact of position on pharyngeal and upper esophageal sphincter (UES) pressure parameters, and pharyngeal-UES pressure gradients. We hypothesized that with increasing degrees of inversion, pharyngeal pressures would increase, as would pressure gradients, to overcome gravitational and positional changes.

Results: Velopharyngeal maximum pressures varied by position (p=0.037), with significantly higher pressures generated with inversion > 90°, compared to upright. Change in position did not significantly affect common mesopharyngeal or UES pressure parameters, nor did it alter swallowing durations. Integral and maximum pharyngeal-UES pressure gradients changed with position (p≤0.01), increasing with inversion > 90° compared to upright and 45°.

Conclusion: Mechanisms of deglutition may differ with position and relative direction of gravity, particularly when at > 45° inclination. Increased palatal pressure is generated in the upside-down position to achieve nasopharyngeal closure and prevent regurgitation. While other classically measured pressures may not consistently differ with positioning, many individuals exhibit adaptations in pharyngeal-UES pressure gradients when inverted, likely due to a combination of changes in pharyngeal driving force and UES opening mechanisms.
QUANTITATIVE ANALYSIS OF ESOPHAGRAM NORMATIVES IN CERVICAL ESOPHAGEAL STENOSIS

Authors: Cherine H Kim, Jacob West, Zachary Reichert, Brianna Crawley, Priya Krishna, Jared C Inman

Institution: Loma Linda University

Presenter: Cherine Kim

Objective: Cervical esophageal stenosis is most often diagnosed with a qualitative evaluation of barium esophagram. The esophagram is the ‘gold standard’ screening exam, yet our previous studies show its sensitivity ranges from 55-80% with dependence on pre-study risk stratification biases, intra- and inter-observer variance. We attempt to delineate normal esophagram diameters and quantitatively analyze esophagrams comparing to routine qualitative analysis.

Method: Patients with cervical esophageal stenosis with dysphagia and abnormal FOSS/FOIS scores were matched with age, sex, height, and BMI controls. Barium esophagram qualitative and quantitative measurements for upper, mid, lower vertebral bodies of C4 through T5 were analyzed in anterior-posterior, oblique, and lateral views.

Results: Stenotic vs non-stenotic controls showed a mean age of 64.1±9.5 and 64.2±9.7, respectively, with no significant differences in height, BMI, or ethnicity. The total measurements per patient were 40.5 for stenotic patients and 41.4 for controls. Stenosis was most commonly located at the C6 lower border and C7 upper border (80%), and extended half a vertebral level in 40% of patients. Mean widths over all levels was 6.5±2.7 mm in stenotic patients and 13.5±4.7 mm in controls (p=0.0001). Anterior-posterior, oblique, and lateral views similarly showed significant differences. At the narrowest mean stenotic point, C7 upper border, the esophagus measured 7.3 mm vs 14.4 mm (p=0.01). The sensitivity of the qualitative esophagram in this study was 64%; application of quantitative intraesophageal means improved sensitivity significantly.

Conclusion: Applying quantitative determinants in esophagram analysis improves sensitivity for cervical esophageal stenosis.
THE RELATIONSHIP BETWEEN HIATAL HERNIA AND CRICOPHARYNGEUS MUSCLE DYSFUNCTION

Authors: Nogah Nativ-Zeltzer, Anaïs Rameau, Maggie A Kuhn, Matthew Kaufman, Peter C Belafsky

Institution: University of California - Davis

Presenter: Nogah Nativ-Zeltzer

Objective: Although the precise etiology of cricopharyngeus muscle (CPM) dysfunction (CPMD) is uncertain, many have hypothesized that a hypertrophied CPM may develop as a protective compensation against gastroesophageal reflux disease (GERD). The purpose of this investigation was to evaluate the association between CPMD and the presence of hiatal hernia (HH) in an attempt to elucidate the relationship between GERD and CPMD.

Methods: The charts of individuals who underwent video fluoroscopic esophagrams between 01/01/14 and 10/30/16 were reviewed from an electronic database. A group of 50 subjects with HH were identified and each was matched by gender and age (+/- 5 years) to an individual without HH. The frequency of CPMD was compared between groups and an odds ratio was calculated.

Results: The mean age (+/- standard deviation) of the HH cohort was 64 (+/-13.4) years and 64 (+/-12.8) years of the group without HH. Thirty-eight percent were male. The frequency of CPMD in the HH group was 78% versus 58% in the non-HH group (p < 0.05). Individuals with a HH were 2.57 times more likely to have evidence of CPMD (95% CI 1.07 - 6.15).

Conclusion: Individuals with a hiatal hernia were 2.57 times more likely to suffer from cricopharyngeus muscle dysfunction (95% CI 1.07 - 6.15). Although these data suggest an association between GERD and CPMD, further research is required before a causal relationship can be assumed.
SEYMOUR COHEN AWARD RECIPIENT

EOSINOPHILIC ESOPHAGITIS IN CHILDREN UNDER THE AGE OF 5 YEARS: CLINICAL CHARACTERISTICS

Authors: Ravi W Sun, Adam B Johnson, Juliana Bonilla-Velez, Robert D Pesek, Gresham T Richter

Institution: University of Arkansas

Presenter: Ravi Sun

Objective: Eosinophilic Esophagitis (EoE) is a chronic immunoallergic disease with associated esophageal inflammation and dysfunction. Evidence suggests that EoE in children has a clinical profile distinct from adults. This study aims to delineate clinical characteristics and treatment outcomes of EoE in the youngest of children.

Method: A 7-year retrospective chart review of children with clinicopathologic diagnosis of EoE was performed with specific analysis of patients under 5 years old. EoE was defined as the presence of symptoms of esophageal dysfunction with pathologically-proven eosinophillic inflammation (≥15 eosinophils per high-power field (EOS/HPF)) unresponsive to reflux therapy. Patients underwent routine esophageal surveillance, ImmunoCAP® analysis and reflux management. Patient parameters and clinical results were systematically reviewed.

Results: Of 558 children diagnosed with EoE, 151 (27.1%) were younger than 5 years old (mean 2.5 yrs). This subgroup presented with reflux symptoms (87.4%), vomiting (84.4%), diarrhea (53.4%), liquid dysphagia (51.7%), and constipation (46.5%), while food impaction was rare. The most common food and aero allergies were egg white (39%), milk (37.8%), and peanut (34.3%), dog dander (11%), cat dander (8.9%), and giant ragweed (8.9%). Patients were managed with anti-reflux medication (88.1%), elimination diet (75.8%), and anti-histamines (53%). After treatment, 87% of parents reported symptom improvement. Mean percent reduction of EOS/HPF in post-treatment biopsy was 72.6% (N=124, p<0.0001, α=0.05), and 78 patients (56.5%) showed histologic resolution of EoE.

Conclusion: Approximately 1/4 of children with EoE present under 5 years of age with multiple esophageal symptoms, comorbidities and allergen-sensitization profiles. These patients demonstrate substantial clinicohistologic improvement following therapy.
TRANSNASAL ESOPHAGOSCOPY: A REVIEW OF OVER 500 CASES

Authors: Jacqui E Allen, James Johnston

Institution: University of Auckland

Presenter: Jacqui Allen

Objective: Examine the indications, rate of findings, completion rate and complications associated with transnasal oesophagoscopy (TNE) performed in a tertiary laryngology practice.

Method: Retrospective review of over 500 consecutive patients undergoing TNE was performed obtaining demographic data, indication, self-reported symptom scores, findings, and completion rate.

Results: Five hundred and eleven patients underwent 1-3 TNE procedures. Mean age was 56 years (range 14 - 89 years). Female 55%, Male 45%. Mean Reflux Symptom Score (RSI) 18.3 (range 0 - 42), mean Eating Assessment Tool-10 (EAT-10) 5.7 (range 0 - 37), mean Voice Handicap Index-10 (VHI-10) 6.6 (range 0 - 33). The most frequent indications for TNE were screening the esophagus in reflux, globus, or dysphagia patients (n = 353), chronic cough (n = 148), head and neck cancer patients (n = 8), choking (n = 6), bleeding (n = 5), or for dilation of esophageal stricture (n = 4). Fourteen procedures (2.7%) were aborted secondary to patient discomfort (n = 8), or adverse nasal anatomy (n = 6). Findings that guided management were found in 80%. Most frequent findings were hiatal hernia (n = 173), irregular squamocolumnar junction (n = 158), patulous gastroesophageal junction (n = 67), Schatzki’s ring (n = 62), Barrett’s esophagus (n = 32), and gastritis (n = 26). No complications were reported.

Conclusion: TNE is well tolerated by patients, informative, and is associated with minimal complications. TNE provides a safe alternative or complement to other endoscopic and radiological oesophageal examinations.
SESSION II:

Tracheal Pathology

Moderators:
Karen Swanson, MD
Michael Rutter, MD
GENDER AND RACIAL DISPARITIES IN THE MANAGEMENT OF INPATIENT CROUP IN THE UNITED STATES

Authors: Jonathan C Simmonds¹, Adam Tuomi², Jan Groblewski³

Institutions: ¹Tufts Medical Center;²Brown University;³Hasbro Children's Hospital

Presenter: Jonathan Simmonds

Objectives: To assess whether differences exist in the epidemiology and the treatment of croup with respect to gender, race, income and geographical location.

Methods: Retrospective cross-sectional weighted analysis of patients under 18 admitted with a diagnosis of croup with a subcohort of patients who required intubation or bronchoscopy, utilizing data from the National Inpatient Sample and Kids’ Inpatient Database from 2003-2013. ICD-9 codes and demographics were analyzed; cross tabulations and linear regression modeling were performed.

Results: Between 2003 and 2013, 258,576 pediatric patients were admitted with a diagnosis of croup, for an overall incidence of 1 per 95 pediatric admissions. Males are 2.08 times more likely to be admitted for croup than females (p<0.001). Croup is least common in Asian patients (1 per 154 pediatric admissions, p<0.001) and African-American patients (1 per 146 pediatric admissions, p<0.001). Compared to other races, African-American children are 2.51 times more likely to undergo bronchoscopy (2.81% vs 1.12%, p=0.013), stay in the hospital longer (2.47 vs 1.86 days, p<0.01), and have a higher cost of care ($3943 vs $2912, p<0.001). Admission and treatment rates did not vary significantly when stratifying by socioeconomic status or hospital location.

Conclusion: Our results confirm the established male predominance for croup, but also reveal a racial discrepancy not previously reported. The low incidence of croup noted within African-American children and high rate of airway intervention may represent delayed presentation and be a surrogate for an access-to-care constraint within this population.
MODIFIED SINGLE-STAGE SEGMENTAL CRICOTRACHEAL RESECTION

Authors: Ihab Atallah¹, Paul Castellanos²

Institutions: ¹Clinique Universitaire d’ORL; CHU de Grenoble; ²University of Alabama

Presenter: Ihab Atallah

Objective: To demonstrate in a large cohort of patients with crico-tracheal stenosis that resection of long airway segments could be performed with no increased risk of postoperative complications.

Method: Consecutive patients getting cervical segmental cricotracheal resection (CTR) were reviewed. The typical segmental tracheal resection technique has been modified to accommodate long segment removal. Modifications include using trachea to enable the reconstruction of the larynx itself as well as the placement of a "laryngosternopexy" between the thyroid lamina to the sternoclavicular ligament designed to take all of the tension off the anastomosis, prevent inadvertent head extension. Anastomosis was performed by using continuous barbed sutures that allowed gradual approximation of the proximal and distal segments even in the presence of a large segmental airway resection defect that could involve as much as half of the tracheal length.

Results: Thirty-eight patients were treated. Primary etiologies of cricotracheal stenosis were prolonged intubation and tracheostomy. In all patients the location was in the subglottis and peristomal trachea. All had Grade III to IV stenosis. Only one patient had postoperative revision surgery for anastomosis-based disease. All were successfully decannulated. Complications occurred in 5 patients. These (all n=1) including acute airway obstruction requiring emergency tracheostomy through the anastomosis, a tracheal dehiscence, airway laryngeal edema with obstruction, superficial wound infections, neck abscesses, and transient vocal cord immobility.

Conclusion: Modified CTR has comparable results to traditional techniques and may offer advantages such as resection of long tracheal segments without any increase in the risk of post-anastomosis airway leak.
COMPUTATIONAL FLUID DYNAMICS STUDY OF AIRFLOW LIMITATION ASSOCIATED WITH SUBGLOTTIC STENOSIS

Authors: Emily Lin¹, Jonathan M. Bock¹, Carlton J. Zdanski², Julia S. Kimbell², Guilherme J.M. Garcia¹

Institutions: ¹Medical College of Wisconsin; ²University of North Carolina

Presenter: Emily Lin

Objective: Subglottic stenosis (SGS) is one of the most common airway disorders in pediatric patients. Currently, treatment decisions rely primarily on the Cotton-Myer scale, which classifies SGS severity based on percentage reduction in airspace cross-sectional area (CSA). However, the precise relationship between CSA reduction and airflow reduction is unknown. This study aims to derive an equation relating airflow and CSA at the subglottis, thus providing a system to classify SGS severity based on airflow limitation. We hypothesize that airway resistance can be described by the Bernoulli Obstruction Theory, which predicts a direct proportionality between airflow and cross-sectional area ($Q \propto CSA$) in cases of severe constriction.

Method: Computed tomography scans of 6 healthy subjects (ranging from ages 5 month-old to 40-year-old) were used to create three-dimensional models of the respiratory tract from nostrils to carina. Virtual modeling was used to insert cylindrical segments of varying degrees of obstruction in the subglottis. Computational fluid dynamics simulations were run and airway resistance was computed.

Results: The simulations revealed that a universal relationship exists between percentage airflow reduction ($Q_{SGS}/Q_{HEALTHY}$) and percentage CSA reduction ($A_{SGS}/A_{HEALTHY}$). In agreement with the Bernoulli Obstruction Theory, all data were fitted by the equation $(Q_{SGS}/Q_{HEALTHY}) = k(A_{SGS}/A_{HEALTHY})$, where $k=2.25 \pm 0.15$.

Conclusion: Our results demonstrate a clear relationship between percentage reduction in airspace CSA and percentage reduction in airflow, irrespective of age and inter-individual anatomic variability. This mathematical relationship can be used to estimate the degree of airflow reduction that corresponds to a percent reduction in CSA in patients with SGS.
EFFECTS OF SUPRA-MAXIMAL BALLOON DILATATION PRESSURES ON ADULT CRICOID AND TRACHEAL CARTILAGE: A CADAVERIC STUDY

Authors: Venkata S Durvasula, Sara C Shalin, Ozlem E Tulunay-Ugur, James Y Suen, Gresham T Richter

Institution: University of Medical Sciences

Presenter: Venkata Durvasula

Objective: Cricoid fracture is a serious concern for balloon dilatation in airway stenosis. Further, there are no studies looking at tracheal rupture in balloon dilatation of stenotic segments. The aim of this study was to evaluate the effect of supra-maximal pressures of balloons on the cricoid and tracheal rings.

Method: Seven Cadaveric laryngo-tracheal complexes (LTCs) of adults with normal anatomy and intact cricothyroid membranes were acquired. Noncompliant Vascular angioplasty balloons (BARD VIDA) were used for dilatation. Subglottis and trachea were subjected to supra-maximal dilatation pressures achieved by using sequentially, higher pressures graduated to Nominal burst pressure (NBP), and if necessary Rated Burst pressures (RBP) and also by use of larger diameter balloon starting from 18 MM size, 20 MM, 22 MM and 24 MM. Thus subglottis and tracheal cartilage rings were both dilated with balloons of varying sizes from small to large upto NBP or RBP. Dilatation was maintained at given pressure for 3 minutes.

Results: The cricoid ring was disrupted by larger diameter balloons (22MM and 24MM) even at lower pressures (below NBP) in six cases. Tracheal cartilage rings were very distensible and external examination after supra-maximal dilatation (24MM at RBP) revealed no obvious fractures. Histopathological examination revealed sloughing of tracheal mucosa in the areas corresponding to balloon placement but no micro-fractures or disruption of perichondrium of tracheal ring cartilages.

Conclusion: These results indicate that cricoid is vulnerable to larger balloons even at lower pressures. Tracheal cartilages despite varying calcification remained largely resilient to supra-maximal dilatation and larger balloons.
OPEN AIRWAY RECONSTRUCTIVE SURGERY IN RESOURCE-LIMITED SETTINGS: HOW THIS CAN BE PERFORMED SAFELY AND EFFECTIVELY

Authors: Roger C Nuss, Isaie Ncogoza, Gratien Tuyishimire

Institution: University Teaching Hospital of Kigali - Rwanda

Presenter: Roger Nuss

Objective: Open airway reconstructive surgery is typically performed in a tertiary or quaternary hospital setting. Resource-limited settings pose a special challenge. There are large numbers of patients who are tracheostomy dependent, yet few surgeons trained in airway reconstruction and only limited resources for post-operative management. This study explores techniques of open airway reconstruction that are applicable to a low-resource setting, to promote patient safety as well as good outcomes.

Method: A retrospective review of 8 patients who underwent open airway reconstructive surgery in a low-resource setting in east Africa from May 2014 through May 2016. Surgical procedures were performed in the main academic teaching hospital by the senior author and assisted by local ORL surgeons who were being trained in airway reconstruction.

Results: Airway stenosis was measured using the Myers-Cotton grading scale, and noted to be Grade III (5 patients) or IV (3 patients). Anterior or anterior/posterior costal cartilage grafts were placed. All procedures were performed as staged procedures, with airway stents removed on post-operative day 7. There were no major complications. Patency of airway at 6 to 12 months status-post reconstruction is the criteria for subsequent decannulation.

Conclusion: Open airway reconstruction is possible in resource-limited settings with a goal of training the local otolaryngology surgeons. Staging the procedure, developing a post-operative care plan, and ensuring airway patency for at least 6 to 12 months before considering decannulation helps to minimize complications yet still yield an acceptable rate of success.
BREAK
SESSION III:

New Technology

Moderators:
Jonathan Aviv, MD
Kris Jatana, MD
3-DIMENSIONAL (3D) TISSUE-ENGINEERED SKELETAL MUSCLE FOR LARYNGEAL RECONSTRUCTION

Authors: Sarah Brookes, Jason Organ, Hongji Zhang, Alexandra Stachel, Sherry Harbin, Stacey Halum

Institution: Purdue University

Presenter: Sarah Brookes

Objective: There is an unmet need for tissue-engineered 3D muscle constructs for laryngeal reconstruction. Functional engineered muscle could be used to repair post-oncologic or traumatic defects, or to medialize the vocal fold in cases of paresis/paralysis. Autologous, organized, engineered muscle that has adequate bulk, integrates into host tissue, and restores function does not currently exist.

Method: Primary skeletal muscle progenitor cells (MPCs) were isolated from F344 rats. 3D muscle constructs were created by encapsulating MPCs in a customized collagen formulation and cultured for 2 under passive tension. Muscle-specific immunohistochemistry and confocal microscopy were used to evaluate muscle tissue differentiation. After 2 weeks of culture, muscle constructs were implanted into surgically created defects in the rat larynx. Post mortem function testing and histology was performed at 1 and 3 months.

Results: Primary skeletal muscle progenitor cells (MPCs) were isolated from F344 rats. 3D muscle constructs were created by encapsulating MPCs in a customized collagen formulation and cultured for 2 under passive tension. Muscle-specific immunohistochemistry and confocal microscopy were used to evaluate muscle tissue differentiation. After 2 weeks of culture, muscle constructs were implanted into surgically created defects in the rat larynx. Post mortem function testing and histology was performed at 1 and 3 months.

Conclusion: This is the first study to demonstrate that functional, 3D tissue engineered skeletal muscle can be developed from primary MPCs and collagen. Collectively, these findings may have tremendous clinical implications for autologous laryngeal muscle repair and reconstruction.
REPRODUCIBILITY AND EASE OF USE IN ENDOSCOPIC AIRWAY MEASUREMENT

Authors: Christian R Francom, Ryan G. Eaton, Cameron A. Best, Jonathan M Grischkan, Christopher K Breuer, Meredith N. Merz Lind, Tendy Chiang

Institutions: 1The Ohio State University; 2Nationwide Children’s Hospital

Presenter: Christian Francom

Objective: A technique for Endoscopic Airway Measurement (EAM) was developed and found to be a viable strategy for characterizing airway dimensions when compared to direct and radiographic measurements. Clinical and translational adoption of EAM is governed in part by its reproducibility and ease of use, which was defined in this study.

Method: Clinicians representing medical and surgical subspecialties were recruited (N=28). A brief tutorial on EAM image acquisition was provided.

Results: There was a statistically significant difference between measurements from the zero previous bronchoscopy experience group (p=0.0443) and the known measurements from our model. There was no significant difference between the groups with previous bronchoscopy experience 1-5 (p=0.4631) or >51 (p=0.5882). There was statistical difference between EAM measurements from the PGY-1-2 group (p=0.0019) but no difference between the PGY 3-4, 5-6, 7-9, or fellow/attending groups (p=0.1751, p=0.8058, p=0.7148, p=0.8335). The participants rated the ease of use as very easy (12), easy (9), somewhat easy (6), somewhat difficult (1), difficult (0) and very difficult (0).

Conclusion: EAM is reproducible and easily adopted among clinicians representing a wide range of airway endoscopy experience. The ease of use of EAM is an important factor in the acceptance and adoption of this technique in clinical and translational applications.
USE OF AUTOLOGOUS ADIPOSE-DERIVED MESENCHYMAL STEM CELLS FOR CREATION OF LARYNGEAL CARTILAGE

Authors: Hongji Zhang, Sarah Brook, Sherry Harbin, Stacey Halum

Institution: Purdue University

Presenter: Stacey Halum

Objective: Adipose derived mesenchymal stem cells (ASC) are an exciting potential cell source for tissue engineering because cells can be derived from the simple excision of autologous fat. No previous studies have successfully created functional 3-dimensional laryngeal cartilage from ASC in collagen.

Method: ASC were isolated from F344 rats, seeded in a customized collagen, and cultured in chondrogenic differentiation medium for 1, 2 and 4 weeks until demonstrating cartilage-like characteristics in vitro. Large laryngeal cartilage defects were created in the F344 rat model, with the engineered cartilage used to replace the cartilage defects, and the rats followed for 1-3 months. Staining examined cellular morphology and cartilage-specific features, and mechanical testing assessed the integrity of the cartilage.

Results: In vitro histological staining revealed rounded chondrocyte-appearing cells evenly residing throughout the customized collagen scaffold, with positive staining for cartilage-specific markers (Safranin 0 and Alcian blue). The cartilage was used to successfully repair large cartilaginous defects in the rat model, with excellent functional results and long term animal survival. Mechanical testing results mimicked those of native laryngeal cartilage.

Conclusion: This study is the first study to demonstrate, in an animal model, that ASC in collagen can be used to create functional cartilage-like grafts, and that the engineered cartilage can be successfully used for partial laryngeal cartilage replacement.
TOXICITY TRIAL OF CANINE POSTERIOR CRICOARYTENOID INTRAMUSCULAR VINCRIStINE INJECTIONS

Authors: Randal C Paniello, Neel K. Bhatt, Rebecca Chernock

Institution: Washington University

Presenter: Randal Paniello

Objective: In animal studies, intramuscular vincristine injections have been shown to block reinnervation of the denervated target muscle. It has been proposed that this application could be used selectively to influence recovery patterns following injury of recurrent laryngeal nerves (RLNs). However, vincristine is currently FDA approved only for intravenous use. A formal toxicity trial of intramuscular injections was performed in canine larynges.

Method: 16 female canines underwent direct laryngoscopy with injection of moderate (0.4mg, n=8) or high (0.6mg, n=8) dose vincristine into posterior cricoarytenoid (PCA) muscles. Plasma samples were collected at various time points post-injection and vincristine levels determined. At 24 hours (n=7) or 14 days (n=9) post-injection, animals were anesthetized and videolaryngoscopy documented vocal fold mobility and mucosal appearance. Adductor function was measured during stimulation of RLN. Larynges were processed for histology.

Results: Fifteen minutes after injection, vincristine plasma levels averaged 10.2% ± 6.7% of the intravenous maximum, suggesting about 90% of vincristine remained within the PCA. Plasma levels were usually below detectable limits within 24 hours. At end points, all animals had grossly normal-appearing mucosa and full range of motion. Laryngeal adductor strength was normal in all cases. Histology showed moderate to severe acute inflammation in the submucosa only in the high-dose group at 24 hours. There was no necrosis of muscle or mucosa.

Conclusion: Intramuscular vincristine injections into the canine PCA resulted in no significant local toxicity, even at the maximum dose. It would be reasonable to evaluate this treatment strategy in a phase I/II human trial.
GLOTTIC STENOSIS: AN ANATOMIC ANALYSIS OF ENDOTRACHEAL TUBE INJURY AND TREATMENT WITH A NEW SELF-RETAINING INTERARYTENOID SPRING

Authors: Steven M Zeitels¹, Patrick Lombardo², Jamie L. Bothelo², James A. Burns¹, James Kobler¹

Institutions: ¹Harvard Medical School; ²Massachusetts General Hospital

Presenter: Steven Zeitels

Objective: Endotracheal intubation is a common cause of acquired glottic stenosis. Severe cases often require an arytenoidectomy/cordectomy, which is irreversible and typically results in poor voice quality. Adult human-cadaver larynges were studied to gain insights about endotracheal-tube (ET) induced posterior-glottic injuries hoping to create a less-invasive remedy.

Method: Microlaryngeal assessments were done on 6 human cadaver larynges (3-men, 3-women) without an ET. Subsequently 6 ET sizes were placed in each larynx before and after glottic/supraglottic structures were removed. After supracriconoid soft-tissue resection, a range of measurements were obtained including the distance between the outer diameter of the ET and the medial aspect of the cricoarytenoid-joint facet. Additionally, measurements of the circumferential arc of different-sized endotracheal tubes were made alongside both cricoarytenoid-joint capsules. This information was used in designing a silastic stent that would function as a self-retaining interarytenoid spring to treat posterior-glottic stenosis.

Results: The shortest distance between the outer diameter of the endotracheal tubes to the medial cricoid facet averaged 4.91mm in males and 4.09mm in females. The average pertinent interarytenoid arc with a #6 endotracheal tube was 144° in men and 140° in women. These data helped fashion parameters for modifying a conventional T-tube to form a new self-retaining silastic interarytenoid spring. The first human case is described, which allowed for successful tracheotomy decannulation and excellent voice quality.

Conclusion: The anatomic investigation herein provided key insights to endotracheal-tube-induced glottic stenosis as well as facilitating a new straightforward procedure for a difficult clinical problem.
Ellen M. Friedman Foreign Body Award:

Case Presentations and Award

Moderator:
Ellen M. Friedman, MD
FOREIGN BODY CASE PRESENTATION 1

AN INADVERT-ANT MIDNIGHT SNACK

Authors: Sean Hashemi¹, Timothy Anderson²

Institution: ¹Boston University; ²Lahey Hospital

Presenter: Sean Hashemi

Objective: Swallowing insects during sleep is a common fear without direct evidence. We report a case of inadvertent nighttime ingestion and hypopharyngeal impaction of an ant.

Method: Case report with video.

Results: The patient is a 60-year-old woman who elicited right-sided throat pain that had been present upon waking. She was concerned of a chicken bone impaction. Flexible laryngoscopy demonstrated an ant adherent to the tip of the epiglottis on the right hand side. Multiple cough attempts did not dislodge the insect. After extensive topical anesthesia flexible forceps were introduced through the scope and choking the ant was eventually grasped, but was inadvertently transected, with the head remaining affixed to the epiglottic mucosa. The patient forcibly removed the scope from her nose, terminating the procedure. Because the head of the ant was still present, we encouraged the patient to go to the operating room for removal, but she elected to wait and see if it resolved on its own. Five days later the patient reported that her symptoms had resolved.

Conclusion: The patient’s pain was first noted after awakening. We presume the ant must have entered her hypopharynx while sleeping and the bite caused her pain. The oral cavity can be a vulnerable entry point while sleeping. A thorough review of literature demonstrates a considerable fear of such an occurrence, but that only anecdotal evidence of nighttime insect ingestion exists. This report should not suggest that this is probable but it does lend evidence that it is at least possible.
FOREIGN BODY CASE PRESENTATION 2

GRILL-CLEANING WIRE BRUSH BRISTLE INGESTION: CASE SERIES AND REVIEW OF THE LITERATURE WITH A CONCENTRATION ON REMOVAL AND THE ROLE OF CT SCAN IMAGING

Authors: Melissa M Mortensen, Elliot Regenbogen

Institution: Stony Brook Medicine

Presenter: Melissa Mortensen

Objective: Case series of an unusual ingested foreign body and how with removal in a minimally invasive way. Their small size can enable them to become incorporated into local tissues, sometimes difficult to locate. We present a series of trans-nasal endoscopic removal and literature review highlighting their management challenges.

Method: Six patients were identified with wire bristle foreign bodies between 2011 and 2016 at our academic tertiary medical center. Their medical records were reviewed and are described in this report.

Results: Three of six patients had the bristle in the lingual tonsils. In one patient it was between the lingual tonsils and the pharyngoepiglottic fold. In two of these cases the foreign body was removed with the transnasal laryngoscope with biopsy forceps under local anesthesia. Two patients underwent direct laryngoscopy with foreign body removal, one requiring intra-operative fluoroscopy. In 1 patient the wire went from the esophagus into the deep spaces of the neck, removed by an open procedure. In one other patient it presented as a complicated deep space neck infection.

Conclusion: Wire brush bristles can easily become displaced while cleaning and subsequently become lodged in the upper or lower aerodigestive tract. Localization of the foreign body is difficult. Radiography is performed, but CT examination is superior for precise localization. Contrast should be used if migration of the foreign body is suspected. Due to the potential of serious complications from ingestion of bristles, wire brushes should be used carefully and grilled foods should be inspected for bristles prior to consumption.
ELLEN M. FRIEDMAN FOREIGN BODY AWARD WINNER

SUCCESSFUL MANAGEMENT OF AN ESOPHAGEAL FOREIGN BODY COMPLICATED BY TEF AND SEPSIS

Authors: Krista Kiyosaki, Varun Vendra, Douglas Sidell

Institution: Stanford University

Presenter: Krista Kyosaki

Objective: Chronic esophageal foreign bodies (FB) rarely perforate the esophagus. Literature regarding FBs with transluminal erosion is scarce. We sought to stimulate discussion regarding the management of retained foreign bodies with fistula formation.

Methods: Case report and literature review.

Results: A 16-year-old female presented to an outside hospital with halitosis and no other symptoms. Imaging revealed an esophageal coin, ingested 8 years prior, with extraluminal migration. Transcervical removal was performed, but the postoperative period was complicated by tracheoesophageal fistula (TEF) and mediastinitis. Upon transfer to our institution, she was septic and hemodynamically unstable. Simultaneous bronchoscopy and esophagoscopy demonstrated a large posterolateral defect of the trachea communicating with the esophageal lumen. The airway was cleared of secretions and a 14mm Hood stent was placed across the tracheal defect. The esophageal defect was cauterized and clipped endoscopically and a nasojejunal tube was placed. Following resolution of her sepsis and stabilization of the fistula site, a two-team approach to repair was performed. A partial esophagectomy with primary closure was performed by pediatric surgery. A primary tracheoplasty with sternal periosteal interposition graft and pedicled myocutaneous flap was performed by otolaryngology. The patient was discharged home two weeks postoperatively without a tracheostomy and tolerating a full oral diet.

Conclusion: Chronic esophageal FBs with transluminal migration are rare and there is no clear management algorithm. Endoscopic retrieval is advocated when possible. If a complicated TEF is present, control of infection and reduction of wound contamination should be performed prior to definitive repair.
### Thursday, April 27, 2017

#### Agenda At A Glance

<table>
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| 7:00 AM - 7:45 AM | Business Meeting and Induction of New Members  
**MEMBERS ONLY** |
| 7:45 AM – 8:00 AM    | Presidential Welcome  
Poster Award Presentations |
| 8:00 AM - 8:30 AM    | Session IV: Cancer Block |
| 8:30 AM - 9:20 AM    | Chevalier Q. Jackson Award and Lecture |
| 9:20 AM - 9:55 PM    | Session V: Voice Disorders Block |
| 9:55 AM - 10:30 AM   | Break |
| 10:30 AM - 11:00 AM  | Session VI: Airway Surgery Block |
| 11:00 AM - 11:45 AM  | Panel I: Mucosal Immunology in the Development and Treatment of Laryngotracheal Disease |
| 11:45 AM - 12:00 PM  | Adjourn with Presidential Close and Member Photograph |
| 5:30 PM – 7:00 PM    | ABEA Poster Reception – Grand Hall Foyer |
| 7:30 PM              | Centennial Gala Reception – Coronado Foyer  
**TICKET REQUIRED** |
SESSION IV:

Cancer

Moderators:
Kerry Olsen, MD
Christine Gourin, MD
FUNCTIONAL AND ONCOLOGIC OUTCOMES OF TRANSORAL KTP LASER SURGERY VERSUS RADIATION FOR T1 GLOTTIC CARCINOMA

Authors: Jamal Ahmed, Ahmed S. Ibrahim, Laura M. Freedman, David E. Rosow

Institution: University of Miami

Presenter: Jamal Ahmed

Objective: To characterize the outcomes for patients who underwent transoral KTP laser ablation of early vocal fold cancers and to compare outcomes with patients who received external beam radiation therapy.

Method: A retrospective review was conducted of patients with T1 glottic carcinoma treated with primary radiation or transoral KTP laser ablation. Oncologic outcomes for both radiation and surgery cohorts including disease-free survival and overall survival were calculated.

Results: Forty-two patients (49%) received primary KTP laser ablation, and 43 (50%) received primary external beam radiotherapy. Average length of follow up was 577 ± 303 days in the KTP laser group, and 833 ± 505 days in the radiation group (P=0.16). There were no significant differences between the two treatment groups in terms of medical or demographic variables. There were 7 recurrences in the KTP laser group (16%), versus 6 in the radiotherapy group (13%) (P=1.00). The laryngeal preservation rate for the cohort patients who initially received KTP laser was 41 out of 42 patients (97%). Of the cohort that received primary radiation therapy, the laryngeal preservation rate was 90% (P=0.30). Disease-free and overall survival was 88% and 97% in the KTP laser cohort and 81% and 93% in the radiation cohort (P=0.51, 0.57).

Conclusion: KTP laser ablation of T1 glottic squamous cell carcinoma is a treatment modality equally effective to radiation and in selected cases may spare patients the side effects of primary radiation therapy.
TRENDS IN LARYNGEAL CANCER: IS THE ETIOLOGY SHIFTING?

Authors: Anju Patel, Kaitlyn Strickland, Adam Klein

Institution: Emory University

Presenter: Kaitlyn Strickland

Objective: Recent studies suggest laryngeal squamous cell carcinoma (SCCa), historically considered a disease of smokers, may affect non-smokers more frequently than previously believed. We studied the association between smoking status and laryngeal SCCa to determine if this association has shifted over time at our institution.

Methods: We performed a retrospective chart review of new diagnoses of laryngeal SCCa seen at our academic tertiary care center clinic. We reviewed 1665 patients to identify new cases of laryngeal SCCa from 2005 to 2015 and record age, gender, smoking status, laryngeal subsite(s), tumor stage, and history of immune suppression, laryngeal papillomatosis, or other head and neck malignancies.

Results: The incidence of laryngeal SCCa at our institution was 40 cases in 2005 (78% male) and 80 cases in 2015 (83% male). The average age of diagnosis was 58 in 2005 and 65 in 2015. Among these patients, the proportion who had never smoked increased from 10% in 2005 to 24% in 2015. Of individuals with glottic SCCa, the percentage of non-smokers increased from 16% in 2005 to 36% in 2015, while the percentage of non-smokers with supraglottic SCCa remained relatively stable (6% to 10%).

Conclusion: We observed an increase in the relative number of non-smokers affected by laryngeal SCCa over a ten-year period, predominantly affecting the glottic subsite. This shift in etiology suggests need for change in our paradigm for screening and management. Further investigation is needed to characterize possible risk factors for laryngeal SCCa in non-smokers such as human papilloma virus.
SAFETY AND EFFICACY OF FUNCTIONAL LARYNGECTOMY FOR END-STAGE DYSPHAGIA

Authors: Michael C Topf, Linda C Magana, Kelly Salmon, James Hamilton, William M Keane, Adam Luginbuhl, Joseph M Curry, David M Cognetti, Maurits Boon, Joseph R Spiegel

Institution: Thomas Jefferson University

Presenter: Michael Topf

Objective: To evaluate functional outcomes and complication rate after total laryngectomy (TL) for dysfunctional larynx with end-stage dysphagia.

Method: Chart review was performed on all patients who underwent TL from January 2008 to July 2016 at a single tertiary academic medical center. Patients who underwent TL for dysfunctional larynx without any evidence of pre-operative disease were included. Main outcome measures were post-TL functional outcomes and complication rate.

Results: The study included 20 patients from a cohort of 278 consecutive patients. 19/20 (95%) patients were previously treated with radiotherapy, while 13/20 (65%) previously received chemotherapy. The median time from (chemo)radiotherapy treatment to TL was 10.98 years (range 0.67 - 23.94 years). 18/20 (90%) patients were aspirating and 12/20 had recurrent aspiration pneumonia pre-operatively. All 20 (100%) patients had dysphagia, 18/20 (90%) were NPO, and 18/20 (90%) required enteral nutrition. 16/20 (80%) had tracheotomy at the time of TL. After TL, 7/20 (35%) patients had 9 complications, including 3 pharyngocutaneous fistulas. At one-year follow-up, rates of aspiration, recurrent pneumonia, dysphagia, need for enteral nutrition, and NPO status significantly decreased after TL (P < 0.05). At one-year follow-up, 0/14 patients were aspirating and 0/14 had recurrent pneumonia. Only one patient (7%) was NPO and 3/14 (21%) patients required enteral nutrition. 12 patients underwent tracheoesophageal puncture by one-year follow-up.

Conclusion: Laryngectomy for dysfunctional larynx eliminates the morbidity of aspiration while improving diet and need for enteral feeding with an acceptable complication rate.
USEFULNESS OF ULTRASOUND FOR ACCESSING THE PRIMARY SITE OF HYPOPHARYNGEAL CARCINOMA

Authors: Hiroaki Ehara, Takahiro Fukuhara, Yuiko Hattori, Eriko Matsuda, Ryohei Donishi, Hiroya Kitano, Hiroya Kitano

Institution: Tottori University

Presenter: Takahiro Fukuhara

Objective: To clarify the advantages of ultrasonography compared with laryngoscopy for accessing hypopharyngeal cancer.

Methods: The subjects were 93 patients who underwent pre-treatment flexible laryngoscopy and ultrasonography. The subjects were accordingly classified into two groups based on the position of the primary site on enhanced computed tomography images; cephalad to cricoid cartilage (cephalad group) and caudal to upper border of cricoid cartilage (caudal group). Furthermore, we elucidated the group-wise differences in utility between laryngoscopy and ultrasonography.

Results: In total, 91 male and 2 female subjects with mean age of 67.5 years were included. The T stage (primary site) included 29 of T1, 20 of T2, 8 of T3, and 36 of T4. In 19 of all included patients, the primary sites with T stages over T3 were detected with ultrasonography. The 44 patients of the T3/T4 stages were divided into two groups including 26 in the cephalad group and 18 in the caudal group. Among the 26 patients in the cephalad group, the primary site of only 6 patients (23%) were detectable by ultrasonography, whereas the primary sites were detectable by ultrasonography in 13 of 18 patients (72%) in caudal group. Moreover, in 2 patients in the caudal group, the primary sites were detected by ultrasonography alone.

Conclusion: Hypopharyngeal primary site T3 and T4 were detectable by ultrasonography. Thus, ultrasonography was especially useful to detect hypopharyngeal cancers that were positioned caudal to upper border of cricoid cartilage.
EFFECT OF PRE-TREATMENT DYSPHAGIA ON DEVELOPMENT OF POST-CHEMORADIATION SWALLOWING DYSFUNCTION IN PATIENTS WITH HEAD AND NECK CANCER

Authors: Daniel Cates, Lisa Evangelista, Peter Belafsky

Institution: University of California - Davis

Presenter: Daniel Cates

Objective: Chemoradiation (CRT) therapy for head and neck cancer can have profound effects on swallowing function. The purpose of this study is to determine the association between pre-CRT dysphagia and post-CRT swallowing dysfunction.

Method: All patients with head and neck cancer at our institution undergo assessment of dysphagia and swallowing dysfunction before and 3 months after CRT. Dysphagia is assessed with the Eating Assessment Tool (EAT10) and swallowing dysfunction assessed with videofluoroscopic swallow study and determination of the Penetration-Aspiration Scale (PAS) and the Functional Oral Intake Scale (FOIS). The association between pre-CRT EAT10 scores and post-CRT PAS and FOIS were evaluated to determine the ability of pre-CRT dysphagia to predict post treatment swallowing dysfunction.

Results: The mean (+/-SD) age of the cohort (N=77) was 62.5 (+10.8) years. The EAT10 for the entire cohort increased from a baseline of 8.7 (+/-11.7) to 11.43 (+/-11.5) post-CRT (p < 0.05). Individuals with a pre-CRT EAT10 <3 had a mean post-CRT FOIS and PAS of 6.6 (+/-1.1) and 1.9 (+/-1.1), respectively. Individuals with a pre-CRT EAT10 >3 had a mean post-CRT FOIS and PAS of 5.1 (+/-1.9) and 3.6 (+/-2.4) respectively. Pre-CRT dysphagia (EAT10>3) was a significant predictor of post-CRT swallowing dysfunction as indicated on the PAS and FOIS (p < 0.01).

Conclusion: The presence of dysphagia before chemoradiation for head and neck cancer is a significant predictor of swallowing dysfunction after the completion of therapy. These results may help target intervention at individuals at high-risk of developing swallowing dysfunction after CRT.
Chevalier Q. Jackson Awardee

Jamie Koufman, MD
Chevalier Q. Jackson Lecture

Think Big, Start Small, Move Fast: An Approach to Impactful Innovation

Nicholas LaRusso, MD
SESSION V:

Voice Disorders

Moderators:
Albert Merati, MD
David Lott, MD
IMMUNOLOGIC RESPONSES TO A NOVEL DNA VACCINE TARGETING HPV11 E6E7

Authors: Simon R A Best, Julie Ahn, Richard Roden

Institution: Johns Hopkins

Presenter: Simon Best

Objective: Recurrent respiratory papillomatosis (RRP) is a benign disease caused by human papillomavirus (HPV) types 6 and 11. Although a prophylactic vaccine against RRP is available, a therapeutic vaccine is needed to treat those already infected. The objective of our study was to design and test a DNA vaccine targeting HPV-11 proteins.

Method: A DNA vaccine encoding the HPV-11 E6 and E7 genes linked to calreticulin (CRT) was generated. Immunologic response to the HPV-11 CRT/E6E7 vaccine was measured by vaccinating C57BL/6 mice via electroporation and measuring CD8+ T cell responses from harvested splenocytes. A tumor cell line containing HPV11-E6E7 was created and the ability of novel DNA vaccine to control tumor growth was measured in vivo.

Results: Our vaccine generated a significant and specific CD8+ T cell response against the HPV11-E6aa41-70 peptide. The CD8+ T cell responses did not recognize E7 epitopes, indicating E6 immunodominance. CD8+ responses were augmented in the CRT-linked vaccine compared to a control non-CRT vaccine. The HPV-11 CRT/E6E7 vaccine was used to treat mice inoculated with a HPV-11 E6E7 expressing tumor cell line after temporary CD3 depletion to facilitate tumor growth. Vaccinated mice had a significantly lower tumor growth rate (p=0.029) and smaller tumor volumes compared to control mice indicating an augmented immunologic response to the E6 and E7 in vaccinated mice.

Conclusion: A DNA vaccine targeting HPV-11 E6E7 generates a specific HPV-11 CD-8+ T cell response capable of reducing the growth of HPV-11 expressing tumors. DNA vaccines are a promising immunologic strategy for treating RRP.
CLINICAL OUTCOMES OF PATIENTS WITH VOCAL FOLD PARESIS DOCUMENTED BY LEMG

Authors: Sean Lewis

Institution: Mount Sinai Hospital

Presenter: Sean Lewis

Objective: This is the first descriptive analysis of patients followed with vocal fold paresis documented by laryngeal electromyography (LEMG). Participants will be able to identify treatment regimens and better counsel patients with vocal fold paresis.

Method: Study design: Historical cohort with chart review. Patients with endoscopic (fiberoptic & stroboscopic) evidence of vocal fold paresis studied by LEMG were included. Patient’s demographics, LEMG findings, diagnostic imaging performed, interventions performed, and outcome on followup were extracted.

Results: 57 consecutive patients were included, 34 male and 23 female, with average age of 55.6. 47 patients presented with voice disturbance, 8 with pain, and 2 with cough. 40 patients presented with left sided paresis, 17 with right. Average length of time to LEMG was 63.2 days. LEMG showed 28 patients had vagal neuropathy (RLN and SLN), 15 had unilateral RLN, 8 of SLN, and 6 patients had normal EMG despite stroboscopic findings of decreased vocal fold mobility. The most common LEMG findings were reduced recruitment and polyphasic units. Interventions performed were voice therapy and voice therapy with injection laryngoplasty. Thirty-eight patients had > 6 months of follow-up, 15 (39.5%) patients had improved mobility, 21 (55.5%) patients were stable, and 2 worsened (5.5%).

Conclusion: There is a high incidence of vagal neuropathy in patients with vocal fold paresis. Patients with idiopathic vocal fold paresis and positive LEMG findings may have improved mobility if followed for > 6 months. Counseling patients on voice therapy and temporary injection laryngoplasty may improve the patient’s symptoms until mobility returns.
Objective/Hypothesis: Vocal fold paralysis is caused by injury to the recurrent laryngeal nerve (RLN), which can occur during head, neck, and thoracic surgery. Current clinical measures of laryngeal innervation are limited and not quantitative. Compound motor action potential (CMAP) is a measure of motor innervation and may be a useful measure of laryngeal innervation following injury. The overall goal of this study was to determine whether CMAP can quantify laryngeal innervation following acute nerve injury.

Study Methods: Twelve canine hemilaryngeal preparations were used. The RLN was serially stimulated with increasing intensities, in order to recruit a greater percentage of RLN axons, until the nerve was maximally stimulated. CMAP amplitude was measured for each intensity stimulation and correlated. Next, the RLN was incompletely transected and the reduction in CMAP amplitude was correlated to the percentage of transected axons. The percentage of transected axons was determined using horseradish peroxidase (HRP) staining.

Results: Combining all hemilaryngeal preparations, the submaximal stimulation of the RLN linearly correlated with the resultant CMAP amplitude (r=0.91, 95%CI 0.83-0.95). Among individual hemilaryngeal preparations, the coefficient of linearity ranged from 0.78-0.98. Following partial RLN transection, the percentage of remaining axons linearly correlated with the CMAP amplitude (r=0.88, 95%CI 0.62-0.97).

Conclusions: CMAP amplitude is a quantitative measure that correlates with the degree of vocal fold innervation in canines. Following RLN injury, CMAP may help clinicians quantify the number of intact axons, assess the likelihood of recovery, and counsel patients on their prognosis.
BROYLES MALONEY AWARD

VOCAL FOLD INJECTION OF ABSORBABLE MATERIALS: A HISTOLOGICAL ANALYSIS WITH CLINICAL RAMIFICATIONS

Authors: James Kobler¹, Steven M Zeitels¹, James T. Heaton¹, Sandeep S Karajanagi¹, Jamie Bothello², Patrick Lombardo², Robert E. Hillman¹

Institution: ¹Harvard Medical School; ²Massachusetts General Hospital

Presenter: Steven Zeitels

Objective: Vocal-fold (VF) injection with absorbable materials includes carboxymethyl cellulose (CMC) and hyaluronic-acid (HA). However, there is limited information about injection-related material diffusion, soft-tissue reactions, absorption properties, and residence time of these materials in vocal folds. Consequently, an investigation was done to shed light on these issues.

Methods: Ten canines underwent microlaryngoscopic injection with ~200ul of Restylane (HA) in the right VF and ~200ul CMC in the left VF: 5-Prolaryn Gel, 5-Renu Gel. Two subjects were sacrificed for histological analysis at the following 5 time points to ensure for complete temporal data for all materials; 3 days, 2, 4, 6 and 8 weeks.

Results: Histological analysis of Restylane consistently revealed well-defined, ovoid aggregates of seemingly-unaltered implant material surrounded by thin capsules with minimal inflammation at all time points. The Restylane diminished slowly so that a substantial amount of free gel was observed at 8 weeks. In contrast, both CMC gels diffused widely within micro-fascial planes in the glottic muscle. There was a robust macrophage/histiocyte response with moderate-severe inflammation noted at all time points. The volume of free CMC gel diminished rapidly so that very little gel was detectable at 6 weeks and none observed at 8 weeks.

Conclusion: Restylane HA demonstrated superior injection localization, tissue compatibility, and residence time. Both carboxymethyl cellulose gels (Renu and Prolaryn) showed immediate wide diffusion resembling a fluid injection precluding precise surgical positioning. Their functionality was further compromised by an immediate robust inflammatory reaction, which results in a relatively short residence time.
QUALITY OF LIFE OF PATIENTS WITH RECURRENT RESPIRATORY PAPILLOMATOSIS

Authors: Michel R San Giorgi, Frederik G Dikkers

Institution: University of Groningen

Presenter: Frederik Dikkers

Objective: Recurrent Respiratory Papillomatosis (RRP) is a disease with a high disease burden. Few studies have assessed quality of life (QoL) of RRP patients. This study compares QoL of these patients with controls. Associations between QoL and sociodemographic and illness-related factors are examined, as is uptake of psychosocial care and speech therapy.

Method: Ninety-one RRP patients (response=67%) from two university hospitals completed the following patient reported outcome measures: HADS, 15D, VHI and RAND-36 assessing health-related QoL and voice handicap, and they provided sociodemographic, illness-related and allied health care use. Descriptive analyses, X2-tests, t-tests, ANOVAs and Pearson correlations were computed to describe the study population, and to examine differences between groups.

Results: RRP patients had significantly higher mean scores on depression, health-related QoL (15D) and on voice problems (VHI), and significantly lower mean scores on anxiety than controls. Dutch patients had more pain and a decreased general health perception (RAND-36) than controls. Dutch patients and older patients were more depressed; women were more anxious; older patients had lower health-related QoL; smoking was significantly associated with voice handicap. Patients who had received psychosocial care had significantly higher HADS-depression mean scores than patients who did not receive psychosocial care.

Conclusion: Having RRP has significant effect on voice-related QoL and depression, but has no negative effect on anxiety and health-related QoL. Risk factors for decreased functioning are different than previously hypothesized by many authors. Prevention should be aimed at these risk factors.
PREDICTING GLOTTAL INSUFFICIENCY USING PITCH ANALYSIS

Authors: Jacob Cohen\textsuperscript{1}, Limor Benyamini\textsuperscript{1}, Alma Cohen\textsuperscript{2}, Yossi Adi\textsuperscript{3}, Joseph Keshet\textsuperscript{3}

Institution: \textsuperscript{1}Rambam Health Care Campus;\textsuperscript{2}Tel Aviv University;\textsuperscript{3}Bar Ilan University

Presenter: Jacob Cohen

Objectives/Hypothesis: Vocal fold paralysis creates a gap during phonation. Symptoms include effortful phonation, vocal fatigue, breathiness and odynophonia. We evaluate the accuracy of a new pitch analysis algorithm in the detection of glottal closure insufficiency caused by vocal cord paralysis.

Methods: Patients with glottal insufficiency caused by vocal cord paralysis diagnosed by fiberoptic laryngoscopy were evaluated before and after injection medialization laryngoplasty. Patients completed VHI (voice handicap index) and GCI (glottal closure index) questionnaires, their voice was evaluated using GRABS scale, VAS (visual analog scale) and computerized measurement of the time it takes to produce the target pitch. We also used voice analysis of normal individual for control.

Results: 28 persons, 14 with vocal cord paralysis and 14 with normal voice, ages 24-82 were included in the final analysis. There was a strong correlation between the GCI, VHI, GRABS and the VAS and the findings in the voice analysis parameters. When patients with vocal cord paralysis produce sustained vowel, the pitch doesn’t approach its final value immediately, there is a rising time of 10-60 msec. Such rising time is not found in speech production of non-pathological voice and in the same patients after vocal cord injection of a filler material. The steady state pitch value of the pathological voice was up to 70\% of the normal pitch.

Conclusion: New parameters with specific clinical findings and applications are needed and important. Using timing measurement to pitch steady state final value we could predict the presence of glottal closure insufficiency.
THURSDAY, APRIL 27, 2017

9:55-10:30 AM

BREAK WITH EXHIBITORS
Session VI:

Airway Surgery and Sleep Medicine

Moderators:
Julie Wei, MD
Maria Suurna, MD
COMPARISON OF A DEDICATED AIRWAY UNIT VERSUS INTENSIVE CARE UNIT: IMPACT ON HOSPITAL COSTS FOR AIRWAY PATIENTS

Authors: Catherine K Hart, Jareen Meinzen-Derr, Tiffany Walberg, Pamela Laramie, Joey Wolfenbarger, Alessandro de Alarcon

Institution: Cincinnati Children's Hospital

Presenter: Catherine Hart

Objective: Post-operative care of patients undergoing airway surgery requires nursing and respiratory therapy staff with specialized training, which at many institutions requires admission to an intensive care unit (ICU). The goal of our study was to perform an analysis of healthcare resource utilization for airway surgery patients admitted to a dedicated airway unit (AU) compared to an ICU.

Method: Billing data was queried for line-item charges for a period of a single fiscal year (2016) for patients with 8 specific airway-related ICD-9 and 10 diagnosis codes who were admitted after airway surgery to the dedicated AU or the ICU. Gross hospital and professional charges were compared.

Results: Eight-one patient admissions were analyzed, including 279 ICU days and 537 AU days. The average total charge per day was $13,561 for the ICU versus $5,962 for the AU, a difference of $7,600 per day. Average length of stay was similar for both units (7.2 vs. 6.6 days for ICU and AU, respectively). Increased ICU cost was primarily due to higher room rate charges ($8,281 vs $4,615), higher respiratory charges ($1,784 vs $543) and higher professional fees ($1,441 vs $432). If all patients admitted to the AU required ICU admission, the increased cost would be an estimated $4,081,200.

Conclusion: A dedicated airway unit is associated with substantial cost savings. Higher ICU charges are primarily due to higher room and respiratory care charges and higher professional fees. A dedicated airway unit may allow institutions to contain costs while maintaining high quality care for airway patients.
IMPACT OF PREMATURITY ON UNILATERAL VOCAL FOLD IMMOBILITY

Authors: Karen B Zur, Linda M Carroll

Institution: The Children's Hospital of Philadelphia

Presenter: Karen Zur

Objective: Advancements in medical care have led to increased survival of premature babies, but some of them experience long-term dysphonia due to intubations, cardiac surgery, and bronchopulmonary dysplasia (BPD). We examined 86 pediatric patients with unilateral vocal fold immobility (VFI) and compared pre-treatment objective acoustic and quality of life data with a subset of 29 subjects who underwent Recurrent Laryngeal Nerve (RLN) reinnervation, to determine whether gestational age had a significant impact on voice functionality outcomes.

Method: Acoustic analysis (jitter, shimmer, NHR, voicing control, vocal range), maximum phonation time, and pediatric voice handicap index (pVHI) were examined pre/post intervention for subjects with gestational age less than 27 weeks (Group A), 28-31 weeks (Group B) and 32-37 weeks (Group C) and >37 weeks (term, Group D) who underwent RLN reinnervation. They were compared against a control group of dysphonic preterm subjects presenting to our Voice Clinic.

Results: Unilateral VFI was most frequently diagnosed in extremely preterm subjects (Group A 41%), and term subjects (Group D 40%). Pre-treatment, pVHI was elevated equally for subjects with VFI (34-42) compared to gestational age controls with dysphonia (32-45), and was not significantly different across gestational age subgroups. Subjects who underwent reinnervation did not have significantly higher pre-treatment pVHI. Objective measures found similar voice dysfunction among dysphonic preterm children.

Conclusion: Prematurity equally increases risk for vocal fold paralysis and for dysphonia from other conditions which affect normal vocal function (scar, sulcus). Attention to laryngeal function remains important in the preterm subject.
SELECTION OF TRACHEOSTOMY TUBE IN THE MORBIDLY OBESE

Authors: Kristan P Alfonso, Michael Kaufman, Rony Aouad

Institution: University of Kentucky

Presenter: Kristan Alfonso

Objective: Tracheostomy complications are significant in the obese population, with increased morbidity and mortality. This study sought to evaluate the differences in outcomes in morbidly obese patients who had placement of extended length tracheostomies (XLT) versus standard length tracheostomy tubes.

Method: All tracheostomies performed at our academic tertiary care institution between January 2013 through November 2015 were reviewed. Morbid obesity was defined as a body mass index (BMI) greater than 35 kg/m² with comorbidities, or greater than 40 kg/m² without comorbidities. Postoperative complications, downsizing and decannulation data was obtained.

Results: 1080 tracheostomies were performed during this period, with 224 (20.7%) in morbidly obese patients. XLT tracheostomies were placed in 31.3% of these patients, with mean XLT tracheostomy BMI of 49.25 kg/m². Similar postoperative bleeding rates were noted between the two groups. Three standard tracheal tube dislodgements were attributed to inappropriate length. During downsizing, 4 other standard tube patients were converted to XLT. Overall mortality was similar for both groups, with 20.0% deaths in the XLT group versus 22.7% in the standard length group.

Conclusion: Despite the selection of an XLT tube over standard tube, significant bleeding and mortality is not different between the two groups. Dislodgements were related to inappropriate tube length.
PREDICTORS OF RESPONSE TO SURGERY IN THYROHYOID PAIN SYNDROME

Authors: Jeffrey M Straub, Daniel J Boulter, Brad W deSilva

Institution: The Ohio State University

Presenter: Jeffrey Straub

Objective: Examine predictors of response to surgery for thyrohyoid pain syndrome with goals to establish a management algorithm for these patients.

Method: Patients diagnosed with thyrohyoid pain syndrome that underwent surgical intervention, including transcervical partial excision of the hyoid bone, styloid process, or superior cornu of the thyroid cartilage, were examined. Resolution of pain symptoms was the main outcome examined and compared to pre-operative predictive factors for success, including abnormal CT findings and response to thyrohyoid space lidocaine injection. Other criteria examined included body mass index, previous neck surgery, and previous neck trauma.

Results: 16 patients underwent surgery for thyrohyoid pain syndrome. 14/16 patients had complete resolution of their pain symptoms while 2/16 had no improvement in their symptoms. 10/16 patients had abnormal CT neck findings including elongated hyoid bone, styloid process, or superior cornu of the thyroid cartilage. 6/16 patients had a normal CT neck while experiencing pain at the lateral hyoid bone. 5/6 patients with normal CT neck underwent pre-operative lidocaine injection and experienced temporary complete resolution of pain symptoms, predicting good candidacy for surgical intervention.

Conclusion: Thyrohyoid pain syndrome is an uncommon disorder that often is refractory to medical management. Surgical intervention, including partial excision of the hyoid bone, styloid process, or superior cornu of the thyroid cartilage, is a viable option for these patients. CT neck is helpful in determining anatomic asymmetry of the thyrohyoid space. In patients with a normal CT neck, in-office lidocaine injection response helps predict success of surgery for thyrohyoid pain syndrome.
LARYNGOPHARYNGEAL FINDINGS OF NOCTURNAL REFLUX: FINDING SCORE REDUX

Authors: Jamie Koufman

Institution: Voice Institute of New York

Presenter: Jamie Koufman

Objectives: To present new observations of the physical findings of laryngopharyngeal reflux (LPR) observed on TFL (transnasal flexible laryngoscopy), and to revise and modernize the reflux finding score (RFS). These observations should help clinicians quantify LPR as well as differentiate the supine (nocturnal) refluxer from the upright (daytime) refluxer. Also presented are the changing patterns of reflux in otolaryngology patients and the clinical manifestations associated with the different reflux patterns.

Methods: Retrospective review and analysis of patients' symptoms, laryngopharyngeal findings on TFL, pharyngeal/UES/esophageal manometry and pharyngeal pH monitoring data.

Results: The findings of patients with primarily daytime reflux are vocal fold edema, pseudo-sulcus, and ventricular obliteration—"anterior findings." Patients with nighttime reflux typically demonstrate posterior commissure hypertrophy, post-cricoid edema (so-called "tiger-striping"), arytenoid erythema, pharyngeal narrowing, cobblestone nasopharynx, and sometimes complete obliteration of the Fossae of Rosenmuller—"posterior findings." It appears that the different laryngopharyngeal findings/patterns result from different exposure times to the refluxate and to its pharyngeal distribution. (The revised RFS increasingly weights posterior laryngeal and pharyngeal findings.) Clinically, nocturnal refluxers more commonly demonstrate impaired esophageal function than daytime refluxers; and nocturnal refluxers frequently experience ear, nose, and sinus symptoms, snoring, sleep apnea, and respiratory problems.

Conclusions: The laryngeal examination (RFS) reveals the pattern and severity of reflux and has great significance in the diagnosis and on-going management of LPR and its protean areodigestive tract manifestations.
Panel I:

Mucosal Immunology in the Development and Treatment of Laryngotracheal Disease

Moderator:
Alexander Hillel, MD

Panelists:
Alexander Gelbard, MD
Alessandro DeAlarcon, MD
Susan Thibeault, PhD
Friday, April 28, 2017
Agenda At A Glance

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<tr>
<th>Time</th>
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<tr>
<td>3:15 PM - 3:20 PM</td>
<td>Presidential Welcome</td>
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| 3:20 PM – 4:05 PM | Presidential Panel:  
                               *Global impact of Disruptive Innovations in Bronchoesophagology and Laryngology – The Story of the Innovator and the Innovation* |
| 4:05 PM - 4:22 PM | President’s Picks –  
                               Innovation/Disruption/Diversity                                      |
| 4:22 PM - 5:15 PM | Panel II: Have We Really Advanced the Field in the Past 20 Years? A Critical Look |
| 5:25 PM - 5:30 PM | Introduction of the New President;  
                               New President Adjourns Meeting                                         |
Presidential Panel

Supported by the Voice Health Institute Endowment

Global Impact of Disruptive Innovations in Bronchoesophagology and Laryngology – The Story of the Innovator and the Innovation

Moderator: Michael Hinni, MD

Panelists:
Robin Cotton, MD
Bruce Haughey, MD
Jamie Koufman, MD
Steven Zeitels, MD
Session VII:

President’s Picks on Innovation/Disruption/Diversity

Moderator: Andrew Blitzer, MD
TARGETING METABOLIC ABNORMALITIES TO REVERSE FIBROSIS IN IATROGENIC LARYNGOTRACHEAL STENOSIS

Authors: Michael K Murphy, Kevin M Motz, Dacheng Ding, Linda X Yin, Madhavi Duvvuri, Alexander T Hillel

Institution: Johns Hopkins University

Presenter: Michael Murphy

Objective: Following airway injury, fibroblast hyperproliferation can lead to laryngotracheal stenosis (LTS). Management remains primarily surgical and there is a need to identify targets for adjuvant therapy. LTS scar fibroblasts exhibit a profibrotic phenotype with distinct metabolic shifts, including an increased glycolysis/oxidative phosphorylation ratio. This study examines the effects of the glutamine antagonist 6-diazo-5-oxo-l-norleucine (DON) on collagen production and metabolism of human LTS derived fibroblasts in vitro.

Method: Fibroblasts isolated from patients with iatrogenic laryngotracheal stenosis were cultured. Gene expression, protein production and cellular metabolism of LTS-derived fibroblasts were assessed in 3 conditions: (1) fibroblast growth medium, (2) fibroblast growth medium with 10(-5) M (low-dose) DON, and (3) fibroblast growth medium with 10(-4) M (high-dose) DON.

Results: As of abstract submission, cell lines from four patients had been analyzed. High-dose DON treatment reduced COL1 (p=0.1226) and COL3 (p=0.0399) expression. Soluble collagen production decreased (p=0.4441, n=2). Glycolytic reserve and glycolytic capacity both decreased (p=0.0185, 0.0314).

Conclusion: The antimetabolic glutamine antagonist, DON, reverses profibrotic changes by inhibiting glycolysis in LTS fibroblasts. In contrast to untreated cells, collagen-3 and glycolysis were significantly reduced. These results suggest DON as a strong candidate for adjuvant therapy in the management of iatrogenic laryngotracheal stenosis.
ATTRIBUTES FOR IDENTIFYING PATIENTS WITH SPASMODIC DYSPHONIA AND OTHER VOICE DISORDERS

Authors: Christy L Ludlow¹, Hyder A. Jinnah², Joel Perlmutter³, Gerald S. Berke⁴, Christine Sapienza⁵, Marshall E. Smith⁶, Joel H. Blumin⁷, Micheal Johns², Randal C. Paniello³, David G. Lott⁸

Institutions: ¹James Madison University; ²Emory University; ³Washington University; ⁴University of California - Los Angeles; ⁵Jacksonville University; ⁶University of Utah; ⁷Medical College of Wisconsin; ⁸Mayo Clinic Arizona

Presenter: Joel Blumin

Objective: 1.) To determine agreement of otolaryngologists, speech-language pathologists and neurologists when classifying patients with spasmodic dysphonia (SD), and related voice disorders, and, 2.) to develop a consensus on attributes that could identify patients with adductor or abductor SD, voice tremor (VT), or muscular tension dysphonia (MTD).

Method: Four voice centers performed speech and nasolaryngoscopy video-recordings of 178 patients with voice disorders using the same protocol. Four independent experts viewed the digital recordings and classified the patients into one of 11 categories. Also, specialists from the 4 centers viewed 50 digital recordings of patients from other centers for classification. We measured inter-rater agreement across and within specialty groups for classifying patients with adductor or abductor SD, VT, MTD or combinations of disorders. We then used a 4 step Delphi Process to develop consensus on attributes for classifying patients with these disorders. A Delphi panel of 14 experts identified and ranked attributes for the 4 disorders, adductor SD, abductor SD, VT and MTD. The rankings were reviewed by 46 specialists in the field yielding a final order of attributes for each disorder.

Results: All groups had poor inter-rater agreement, kappa ≤ 0.3, when classifying patients. The Delphi process identified and ranked between 2 and 6 attributes for identifying each of the voice disorders.

Conclusions: Our finding of poor agreement among specialists when classifying patients with and without SD led to a Delphi type consensus on attributes for specialists to use when identifying patients with adductor and abductor SD, VT, and MTD.
ADDUCTOR FUNCTION AFTER CANINE RECURRENT LARYNGEAL NERVE INJURY AND REPAIR

Authors: Randal C Paniello¹, Stacey L. Halum², Neel K. Bhatt¹, Khadijeh Bijangi-Vishehsaraei³, Hongji Zhang², Sarah Brookes²

Institution: ¹Washington University; ²Purdue University; ³Indiana University

Presenter: Randal Paniello

Objective: Muscle progenitor cells (MPCs) can be isolated from muscle samples and grown to a critical mass in culture. They have been shown to survive and integrate when implanted into rat laryngeal muscles. In this study, the ability for MPC implants to enhance adductor function of reinnervated thyroarytenoid muscles was tested in a canine model.

Method: Sternocleidomastoid muscle samples were harvested from three canines. MPCs were isolated and cultured to about $10^7$ cells over 4-5 weeks, then implanted into right thyroarytenoid muscles after ipsilateral recurrent laryngeal nerve transection and repair. The left sides underwent the same nerve injury, but no cells were implanted. Laryngeal adductor force was measured pre-treatment and again six months later, and the muscles were harvested for histology.

Results: MPCs were successfully cultured from all dogs. Laryngeal adductor force measurements averaged 60% of their baseline pre-treatment values in non-implanted controls, 98% after implantation with MPCs, and 128% after implantation with motor end plate-enhanced MPCs. Histology confirmed the implanted MPCs survived, became integrated into thyroarytenoid muscle fibers, and were in close contact with nerve endings, suggesting functional innervation.

Conclusion: Muscle progenitor cells were shown to significantly enhance laryngeal adductor function in this pilot canine study. Patient-specific MPC implantation could potentially be used to improve laryngeal function in patients with vocal fold paresis/paralysis, atrophy, and other conditions. Further experiments are planned.
Panel II: Have We Really Advanced the Field in the Past 20 Years? A Critical Look

Moderator:
Albert Merati, MD

Panelists:
Michael Johns, MD
Lucian Sulica, MD
David Francis, MD
Blake Simpson, MD
Introduction of New President
**Broyles-Maloney Award**

The Broyles-Maloney Award was established to encourage advancement of the art and science of bronchoesophagology and closely related subjects. Competition for the award is limited to persons whose abstracts are submitted for inclusion in the Annual Scientific Program. The award is given for outstanding manuscript, thesis or accomplishments in bronchoesophagology, laryngology or related science.

**RECIPIENTS OF THE BROYLES-MALONEY AWARD:**

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Chevalier Q. Jackson Award Recipients

1959-2017

1959 Louis H. Clerf, MD
1960 (no award)
1961 Herman J. Moersch, MD
1962 Paul H. Holinger, MD
1963 Edwin N. Broyles, MD
1964 Leroy A. Schall, MD
1965 Herbert W. Schmidt, MD
1966 Paul G. Bunker, MD
1967 Joel Pressman, MD
1968 Verling K. Hart, MD
1969 Joseph P. Atkins, MD
1970 Anderson C. Hilding, MD
1971 Robert M. Lukens, MD
1972 Charles M. Norris, MD
1973 Arthur M. Olsen, MD
1974 Charles F. Ferguson, MD
1975 Shigeto Ikeda, MD
1976 Blair W. Fearon, MD
1977 Francis W. Davidson, MD
1978 Seymour R. Cohen, MD
1979 M. Stuart Strong, MD
1980 DeGraff Woodman, MD
1981 Albert H. Andrews Jr., MD
1982 Gabriel F. Tucker, Jr., MD
1983 Howard A. Andersen, MD
1984 Paul H. Ward, MD
1985 Bruce N. Benjamin, MD
1986 Loring W. Pratt, MD
1987 Robert S. Fontana, MD
1988 Charles W. Cummings, MD
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<td>Jamie Koufman, MD</td>
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Ellen M. Friedman Foreign Body Award

The Ellen M. Friedman Foreign Body Award is given to an accepted abstract in recognition of excellence in innovation, skill and education in the management of aero-digestive foreign bodies. It is intended to encourage continued leadership in the art of endoscopic foreign body management.

RECIPIENTS OF THE ELLEN M. FRIEDMAN FOREIGN BODY AWARD:

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<td>Aaron Chidekel, MD</td>
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<td>Maria Wittkopf, MD</td>
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<td>Dawn N. Boswell, MD</td>
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<td>Aaron D. Friedman, MD</td>
<td>Keiko Hirose, MD</td>
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<td>Peter J. Kolta, MD</td>
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Seymour R. Cohen Award

The Seymour R. Cohen Award for Pediatric Laryngology and Bronchoesophagology is presented to any resident, fellow or practicing physician who submits the best original paper in either basic research or clinical investigation pertaining to pediatric laryngology and bronchoesophagology.

RECIPIENTS OF THE SEYMOUR R. COHEN AWARD:

1979 Timothy A. Lim, MD
1980 Lauren D. Holinger, MD
1981 Bruce N. Benjamin, MD
1982 John A. Tucker, MD
1983 John S. Supance, MD
1984 Judson R. Belmont, MD
1985 Kenneth M. Grundfast, MD
1986 Ellen M. Friedman, MD
1987 Glenn C. Isaacson, MD
1988 John A. Tucker, MD
1989 Kenneth M. Grundfast, MD
1990 John G. Snodgrass, MD
1991 Steven C. Marks, MD
1992 John J. Smith, MD
1993 William Smits, MD
1994 (no award)
1995 John P. Bent, III, MD
1996 (no award)
1997 Robert F. Ward, MD
1998 Brian S. Jewett, MD
1999 Ryan R. Stevens, MD
2000 (no award)
2001 Nancy M. Bauman, MD
2002 Deqiang Wang, MD
2003 (no award)
2004 Glenn C. Isaacson, MD
2005 John G. Snodgrass, MD
2006 John G. Snodgrass, MD
2007 John G. Snodgrass, MD
2008 John G. Snodgrass, MD
2009 John G. Snodgrass, MD
2010 (no award)
2011 (no award)
2012 (no award)
2013 Kevin Huoh, MD
2014 (no award)
2015 (no award)
2016 (no award)
2017 (no award)
The Steven Dean Gray Resident Award was established as part of the continuing legacy of Dr. Gray in order to recognize excellence in resident research in both laryngology and bronchoesophagology.

RECIPIENTS OF THE STEVEN D. GRAY RESIDENT AWARD

2003 Sarah Hodges, MD  
2003 Randal Leung, MBBS  
2004 Seth Cohen, MD  
2004 Jonathan P. Lindman, MD  
2005 Grace SY Yang, MD  
2006 None  
2007 Tsunehisa Ohno, MD  
2008 J. Matthew Dickson, MD  
2009 Wataru Okano, MD  
2010 None  
2011 Richard Turley, MD  
2012 Koshi Otsuki, MD  
2013 Mitsuyoshi Imaizumi, MD  
2014 None  
2015 Yuta Nakaegawa, MD  
2016 Neel Bhatt, MD  
2017 Neel Bhatt, MD
Scientific Poster Reception – Grand Hall Foyer

All registrants and guests are invited. Scientific Posters will be attended by authors.

Abstracts of ABEA submissions to the Combined Scientific Poster Session appear on pages (84-168) of this program booklet.
LONG-TERM CLINICAL DISPOSITION FOLLOWING IN-OFFICE INJECTION LARYNGOPLASTY WITH CALCIUM HYDROXYAPATITE

Authors: Zain H Rizvi, Jose Alonso, Dinesh Chhetri, Gerald Berke, Jennifer Long, Abie Mendelsohn

Institution: University of California – Los Angeles

Presenter: Zain Rizvi

Objective: Calcium hydroxyapatite has been demonstrated as a safe and effective injection material for vocal fold medialization; however, the long-term status of patients undergoing this procedure is not well described. We sought to determine treatment duration and patient-centered clinical outcomes following calcium hydroxyapatite injection laryngoplasty.

Method: In-office injection laryngoplasty patients were identified by CPT code (31570), between the dates of 1/1/2013 and 1/1/2016 and clinical data recorded.

Results: Sixty patients underwent calcium hydroxyapatite injection laryngoplasty during the time period studied, most commonly for complete unilateral vocal cord paralysis (49.2%) followed by unilateral vocal fold paresis (30.5%), with 77% of patients receiving a single injection. Thirty-three patients returned for follow up (55.0%) with a mean follow up duration of 336 days (median=256). Thirteen of the 33 (39.3%) long-term follow up patients underwent at least one additional in-office injection laryngoplasty due to reported persistent (46.2%) or return of dysphonia (53.8%), with a median time interval of 103 days to second injection. 11.7% of the long-term follow up patients elected for open surgical management. While volume of injection (p<.005) and age (p<.001) was associated with time to repeat injection, number of injections (p=0.450) was not predictive of advancement to surgical intervention.

Conclusion: In-office injection laryngoplasty with calcium hydroxyapatite offers excellent and durable patient-centered outcomes when long-term medialization is desired. The majority of patients sought only a single procedure, and only 7% of patients progressed to surgical medialization.
RETAINED AIRWAY FOREIGN BODY IN A LARYNGECTOMY PATIENT - THE DANGER OF THE MODIFIED LARYNGECTOMY STOMA BUTTON

Authors: Bradley J Petty; Adam E Singleton; Merry E Sebelik

Institution: University of Tennessee Health Sciences Center

Presenter: Bradley Petty

Objective: 1. Describe an unusual case of a retained stoma button in a laryngectomy patient. 2. Highlight the dangers of modifying airway devices and their difficulty in being identified radiographically.

Methods: A case report of a laryngectomy patient who presented with fever and increasing productive cough and found to have a modified stoma button lodged within his airway. Photographs of the prosthesis were obtained.

Results: A laryngectomy patient presented with fevers, productive cough and shortness of breath. The patient had a stoma button that he had modified to assist with the use of a tracheoesophageal prosthesis that he had lost six months prior to this episode. During that time frame, the patient had been treated for an episode of pneumonia and had a chest x-ray obtained with no foreign body being identified. Flexible tracheobronchoscopy was performed and a plastic tube was identified lodged at the left main stem along with purulent secretions. This was removed with McGill forceps in the clinic.

Conclusions: Most reported cases of laryngectomy foreign body aspirations involve voice prostheses or portions of stoma cleaning kits. Only a few cases report aspiration of stoma buttons. This unique case highlights the danger of modifying airway devices. The patient had modified his stoma button in such a way that it no longer retained sufficient integrity to prevent aspiration. Additionally, it is important to highlight that many devices used within and around the stoma are radiolucent allowing for missed or delayed diagnosis, especially when clinical suspicion is low.
ENDOSCOPIC REMOVAL OF DYSTROPHIC THYROID CARTILAGE CALCIFICATION WITH A TISCHLER CERVICAL BIOPSY PUNCH

Authors: Brian A. Nuyen; Christopher G. Tang

Institution: Stanford Medicine

Presenter: Brian Nuyen

Objective: To discuss a unique method of endoscopical removal of bone masses from the pyriform sinus using a Tischler cervical biopsy instrument.

Method: A case report with a description of a unique surgical technique. A 68-year old man with a six-month history of globus sensation presented to Head and Neck Surgery clinic with a left pyriform sinus mass. An attempted in-office biopsy of the mass failed as the mass was too firm to be biopsied with transoral instrumentation. Computed tomography imaging revealed a calcified tumor in the pyriform sinus originating from the thyroid cartilage.

Results: The patient was taken to the operating room, and the mass was visualized with a Bouchayer laryngoscope. Various instruments were used in the attempt to excise this calcified mass including a multiple laryngeal instruments, an osteotome, carbon dioxide laser, and a laparoscopic cholecystectomy Endoshear. After the mucosa was lifted off the bony mass, the superior cornu of the thyroid cartilage was separated with the Endoshear, and a Tischler cervical biopsy instrument was used to grasp the lesion and separate it off the thyroid cartilage. Final pathology showed mature bone with dystrophic ossification of thyroid cartilage. Patient recovered excellently.

Conclusion: Transvaginal instruments such as the Tischler cervical biopsy forceps are sturdy instruments that afford firm grasps of intraluminal laryngeal bony lesions and can aid in lesional excision.
LARYNGEAL MASK AIRWAY VENTILATION DURING PEDIATRIC ENDOSCOPIC LARYNGOTRACHEAL SURGERY

Authors: Peter J Ciolek; Blake R Smith; Brandon S Hopkins; Paul R Krakovitz

Institution: Cleveland Clinic

Presenter: Blake Smith

Objective: To describe our novel technique and experience with laryngeal mask airway (LMA) ventilation during pediatric airway surgery, an alternative to jet-ventilation or intermittent intubation.

Methods: Total intravenous anesthesia was administered. An LMA (cuff deflated) was inserted in the standard position. A Benjamin-Lindholm laryngoscope was passed anterior to the LMA, the larynx was exposed, and the laryngoscope was placed into suspension. This secured the LMA into position with the ventilating port oriented posterosuperior to the larynx allowing for continuous ventilation. The planned laryngotracheal procedure was performed. Vital signs, including continuously tracked oxygen saturation were obtained from the anesthesia record.

Results: Six patients underwent laryngotracheal surgery using the described ventilation technique. Patients were 7 months, 13 months, 15 months, 16 years, 17 years, and 18 years old at the time of surgery. Operative times ranged from 10 to 40 minutes. Operations performed included two injection medializations, a subglottic cyst excision, an excision of respiratory papilloma, a supraglottoplasty, and a subglottic dilation. Only one patient was intubated intermittently for airway sizing with an endotracheal tube. On average, patients spent < 1 min with a SaO2 of < 90%.

Conclusion: Placement of an LMA prior to suspension microlaryngoscopy provides an effective method for hands-free ventilation while allowing for an unobstructed view. This approach avoids interruptions for intermittent intubation and offers an alternative to jet ventilation, mitigating the risk of barotrauma. This method is effective for a variety of endoscopic procedures among pediatric patients of all ages.
A005

BLUNT LARYNGOTRACHEAL TRAUMA IN CHILDREN

Authors: Jeffrey Cheng; Matthew Cooper

Institution: Duke University Medical Center

Presenter: Matthew Cooper

Objective: Systematic review of blunt pediatric laryngeal and tracheal trauma and development of proposed evaluation and management strategy.

Method: Systematic review and proposed clinical consideration algorithm. A medical librarian was utilized, and the following data sources were queried: PubMed, EMBASE, Web of Science, and Cochrane Central Register of Controlled Trials.

Results: 329 titles and abstracts were identified, and 50 reports were included. A total of 66 children were identified, with a majority of males (76.1%). Average age was 9.5 years of age [range 2 - 17]. CT was employed in 66.7% of cases. False negative CT occurred in 29.5% of cases. Treatment consisted of observation (9.1%), endoscopy alone (31.8%), endoscopic repair (7.6%), and open neck exploration with repair/open reduction internal fixation (ORIF) (51.5%). Tracheotomy was utilized in 33.3% of the cases. Mortality was rare, with only one (1.5%) reported and occurred within one hour after presentation.

Conclusion: Significant deviation and variation from recommended previously proposed management algorithms exists in reported cases. Awareness of the natural clinical history, potential for severe morbidity or mortality, and associated complications is extremely important. CT and fiberoptic, bedside laryngoscopy may not play a significant role but may add to clinical evaluation prior to operative intervention. If employed, care must be taken to not create an unstable clinical scenario. Operative endoscopy is recommended in cases with positive physical examination findings, and treatment tailored to extent of injury.
NOVEL REGENERATIVE APPROACH FOR THE PREVENTION OF VOCAL FOLD SCARRING USING BIODEGRADABLE GELATIN HYDROGEL WITH BASIC FIBROBLAST GROWTH FACTOR (BFGF)

Authors: Mitsuyoshi Imaizumi; Ryosuke Nakamura; Yuta Nakaegawa; Bayu Tirta Dirja; Yasuhiro Tada; Akiko Tani; Yasuhiko Tabata; Koichi Omori

Institution: Fukushima Medical University

Presenter: Mitsuyoshi Imaizumi

Objective: Postoperative dysphonia is mostly caused by vocal folds scarring. It is reported that careful preoperative, operative and postoperative management of vocal fold surgery can reduce the risk of the scar formation. However, depending on the extent and depth of the vocal fold surgery, the scar prevention can be challenging. Numerous studies including animal experiment and clinical application have been performed to solve the problem, however the consensus has not been reached. Our goal was to develop the novel regenerative approach for the prevention of the scarring after vocal fold surgery using biodegradable gelatin hydrogel with basic fibroblast growth factor (bFGF).

Method: Videoendoscopic laryngeal surgery was performed to make vocal fold injury for fourteen rabbits. Injectable biodegradable gelatin hydrogel with bFGF were injected in unilateral vocal fold immediately after the surgical procedure. Two weeks after injection, larynges were excised for evaluation of vocal fold histology and mucosal movement.

Results: The presence of poor vibratory function was confirmed in injured vocal folds. Histology and digital image analysis demonstrated that injured vocal folds injected with gelatin hydrogel with bFGF showed less scar formation.

Conclusion: The prevention of the scar formation after vocal fold surgery using biodegradable gelatin hydrogel with bFGF was demonstrated histologically and functionally. Our results suggest that biodegradable gelatin hydrogel with bFGF could be a new approach for the prevention of vocal fold scar formation after the surgery.
EFFECTS OF CHEMICAL STIMULATION OF THE PARABRACHIAL NUCLEUS ON VOCAL MOTOR REGULATION IN GUINEA PIGS

Authors: Yoichiro Sugiyama; Shinya Fuse; Shigeyuki Mukudai; Shigeru Hirano

Institution: Kyoto University of Medicine

Presenter: Yoichiro Sugiyama

Objective: The midbrain periaqueductal gray (PAG) plays a pivotal role in the generation of vocalization in rodents as well as other mammals. Electrical stimulation of the call sites which consist of the descending pathway from the PAG to the lower brainstem can induce vocalization. On the other hand, the parabrachial nucleus (PBN) located in the dorsolateral pons has an important relation to the audio-vocal feedback as well as respiratory rhythm regulation during echolocation in bats. The purpose of this study was to evaluate whether the PAG-induced vocalization is modulated by the activity of neurons in the PBN in guinea pigs.

Method: The five-barreled glass micropipette, filled with the excitatory amino acid, the GABA receptor agonist, the GABA receptor antagonist, and the kainic acid, respectively, was used for microinjection of each drug. Electrical stimulation was delivered through the rest one with a electrode in a solution of 1 M NaCl to identify whether the tip of the micropipette was positioned at the PBN. The muscle activities, including the diaphragm, external oblique, and intralaryngeal muscles, and the voice were recorded before and after the injections during vocalization induced by electrical stimulation of the PAG in guinea pigs.

Results: The vocal duration or frequency was modulated by glutamatergic or GABAergic stimulation of the PBN. The effective injection sites were broadly distributed in the PBN.

Conclusion: The PBN can contribute to the regulation of both vocal-respiratory and vocal-pitch coordination in terms of PAG-induced vocalization in guinea pigs.
ACUTE ONSET DYSPHAGIA AND ASPIRATION FOLLOWING CLEFT PALATE REPAIR

Authors: Shira Koss

Institution: NYEEI of Mount Sinai

Presenter: Shira Koss

Objective: To report a case of acute onset of profound dysphagia and microaspiration following Furlow palatoplasty and pharyngoplasty with allograft augmentation in a 14 year-old male.

Methods: Case report

Results: The patient presented one week post-operative with progressive dysphagia to liquids and solids and 17 lb. weight loss. Initial MBSS showed laryngeal penetration with severely decreased opening of the upper esophageal sphincter and minimal bolus passage. Differential diagnosis included URI, conversion disorder, tongue base neuropathy, pharyngeal plexus neuropathy, and muscle re-patterning discoordination. The patient demonstrated no improvement despite medical and dysphagia therapy. Return to the operating room POD#8 demonstrated normal esophagoscopy. The allograft was removed. Gastroenterology, neurology, and psychiatry work-up were negative. Repeat MBSS POD#11 revealed persistence of the above findings with microaspiration. Laryngeal EMG showed normal constrictor muscles but absent recruitment in the left tongue base, though tongue mobility was normal on physical exam. The patient was discharged with a nasogastric feeding tube and continued intensive dysphagia therapy. At 5.5 weeks post-operative he began to tolerate liquids and improved to regular diet at seven weeks.

Conclusion: We hypothesize that acute onset of profound dysphagia and microaspiration following Furlow palatoplasty and pharyngoplasty was due to disruption of congenitally immature pharyngeal and laryngeal muscle coordination. Contributing factors include: 1) neurogenically underdeveloped swallow mechanism, 2) abnormal baseline swallow mechanism and patterns due to cleft palate, 3) discoordination of muscle patterns after surgical adjustment of his anatomy with palatoplasty and allograft, 4) possible intra-operative disruption of the pharyngeal plexus by allograft placement.
CULTURAL VARIATIONS IN AERODIGESTIVE TRACT FOREIGN BODIES

Authors: Christine DeMason\textsuperscript{1}; Jessica Maxwell\textsuperscript{2}; Michael Reilly\textsuperscript{1}

Institution: \textsuperscript{1}Georgetown University Hospital; \textsuperscript{2}Washington DC VA Medical Center

Presenter: Christine DeMason

Objective: The most common foreign bodies (FB) in the aerodigestive tract differ depending on age, geographic location and culture. Impacted food boluses and fish bones are the most prevalent FB in adults in western countries. Other types of animal bone FB are infrequent. We present two cases of goat bone FB where cultural awareness was important in the diagnosis and management of these patients.

Method: We describe two distinct cases of aerodigestive goat bone FB. Pertinent FB literature will be reviewed.

Results: Case One was a 55-year-old male who presented with a FB sensation after eating goat meat at a restaurant. Flexible laryngoscopy revealed a 40x1x1mm bone in the pyriform sinus. The bone was removed with direct laryngoscopy under general anesthesia. Case Two was a 60-year-old female who presented after a choking episode while eating goat soup. CT scan revealed a 40x40x5mm triangular-shaped bone in the cricopharyngeal inlet. The patient underwent rigid esophagoscopy with removal of the bone. No complications occurred in either patient. On further investigation both patients were observing Ramadan, a month-long Islamic holiday of prayer and dawn-to-dusk fasting. This holiday includes nightly feasts where goat meat is routinely eaten. Understanding these two patients’ cultural background was important in treating these patients. These cases also demonstrate the need for swift management as bone FB have rates of esophageal perforations between 10-50%.

Conclusion: Aerodigestive FB vary depending on patient demographics, geography, and cultural practices. These two cases illustrate the importance of cultural awareness on FB evaluation and management.
LARYNGEAL CLEFT TYPE IV: ONE CONDITION WITH DIFFERENT PRESENTATIONS

Authors: Gabriel Hernandez; Carlos Gonzalez-Aquino; Edgar Del Toro Diez; Gabriel Rivera-Rivera

Institution: University of Puerto Rico

Presenter: Gabriel Hernandez

Objective: To heighten the awareness of the possibility of a laryngeal cleft in neonates. We describe two completely different clinical presentations of patients born with grade IV laryngeal cleft at our institution. One patient presented with respiratory failure and another was diagnosed incidentally on imaging studies performed due to intermittent desaturation. A systematic review of literature on management of patients with grade IV laryngeal cleft was performed.

Method: Two cases diagnosed with grade IV laryngeal cleft at our institution are presented. A systematic review of literature using key words "laryngeal cleft", "laryngotracheoesophageal cleft" and "type IV cleft" was performed.

Results: Laryngeal clefts are the result of failure of adequate fusion of embryological precursors. Neonates with this condition can debut with varying symptomatology and have very different short term prognoses. A high index of suspicion is paramount for prompt diagnosis in patients presenting with a broad range of respiratory symptoms. Due to its rarity, there is little evidence based literature on the diagnosis and management of these patients. Despite major advancements in surgical techniques and management, grade IV laryngeal cleft is still associated with high morbidity and mortality.

Conclusion: Neonates with grade IV laryngeal clefts can present with a diversity of airway symptomatology. Increased awareness of diverse presentations may aide in early diagnosis. Treatment should be individually tailored based on the initial presentation and not solely on severity of intraoperative findings or imaging. Continued reporting of this rare entity is encouraged in order to improve general medical knowledge.
DELAYED MULTIFOCA L TRACHEAL INJURY FOLLOWING THYROIDECTOMY: CASE REPORT AND LITERATURE REVIEW

Authors: Matthew Shew; Shannon Kraft

Institution: University of Kansas

Presenter: Matthew Shew

Objective: We report a case of delayed, multifocal tracheal necrosis following thyroidectomy

Method: We discuss the pertinent clinical, radiographic and operative findings, and review the literature regarding delayed tracheal injuries.

Summary: A 23-year-old male underwent total thyroidectomy with neck dissection for papillary thyroid cancer. Our service performed a vocal fold injection on post-op day five for vocal cord paralysis. Incidentally, he was noted to have granulation tissue in the subglottis. Bronchoscopy showed a 4 cm segment of inflamed mucosa mid-trachea. He returned on post-op day twelve with neck swelling that enlarged with Valsalva. A CT neck revealed subcutaneous emphysema and an anterior tracheal wall defect. He was taken urgently to the OR. Intra-operatively, the anterior wall defect was identified at the second tracheal ring. Additional defects were discovered in the intracartilaginous spaces between rings 9 through 12. A tracheotomy was placed and muscle flaps were used to repair the defects. Thyroidectomy is a routine procedure and complications are uncommon. Tracheal injury is extremely rare, with an incidence of 0.06%. Typically, these injuries are recognized and repaired intraoperatively. Delayed rupture secondary to tracheal necrosis is exceedingly rare, with only seven reported cases. These limited case reports are without consensus on pathogenesis or management.

Conclusion: To our knowledge, this is the first report of multifocal iatrogenic tracheal injury. While there is limited literature on the management of isolated tracheal necrosis, the management of a multifocal injury requires a multidisciplinary approach and an armamentarium of reconstructive techniques.
SURGICAL HISTOANATOMY FOR ADDUCTION ARYTENOPEXY USING INJECTION LARYNGOPLASTY

Authors: Kiminori Sato; Shun-ichi Chitose; Fumihiko Sato; Hirohito Umemo

Institution: Kurume University

Presenter: Kiminori Sato

Objective: Injection laryngoplasty is commonly performed to improve glottal incompetence in patients with vocal fold paralysis. To improve the large posterior glottal gap and/or aspiration, the injection should be placed in the thyroarytenoid muscle not only at the midmembranous vocal fold but also at the cartilaginous portion of the vocal fold (lateral to the oblong fovea of the arytenoid cartilage) to make adduction arytenopexy possible. Surgical histoanatomy for adduction arytenopexy with injection laryngoplasty was investigated using whole organ laryngeal section study.

Method: Eight human adult larynges obtained from autopsy cases were investigated using the whole-organ serial section technique. Results: The posterior portion of the thyroarytenoid muscle is attached to the oblong fovea of the arytenoid cartilage. Vertical thickness of the posterior aspect (lateral to the vocal process) of the thyroarytenoid muscle was relatively thin (3.4±0.4 mm), especially in females (3.2±0.3 mm). Consequently, care should be taken for the correct depth of needle placement. If the needle is placed too deep, augmentation substances are injected into the lateral cricoarytenoid muscle located beneath the thyroarytenoid muscle or paraglottic space located inferolateral to the thyroarytenoid muscle.

Conclusion: The injected portion and the amount of injected material should be modified based on the pathological conditions of the voice disorder and aspiration. Knowledge of the three-dimensional structure of the larynx is crucial in performing this surgical procedure and in injecting the materials into the proper portion and in the proper amount for improving voice disorder and aspiration.
HEMODYNAMIC CHANGES ASSOCIATED WITH TRANSCERVICAL LARYNGEAL INJECTION OF BOTULINUM TOXIN

Authors: Amanda Jo L Marcellino; Ben D Lovin; Stephen C Wright Jr.; Francis O Walker; Lyndsay L Madden

Institution: Wake Forest

Presenter: Lyndsay Madden

Objective: Transcervical laryngeal botulinum toxin injections for treatment of laryngeal dystonia in the office setting is widely regarded as safe, despite the paucity of literature regarding hemodynamic changes during this procedure. This study examines hemodynamic changes during transcervical laryngeal botulinum toxin injection in an effort to establish normative data, and then to compare these to established benchmarks for patient safety.

Method: Patients undergoing transcervical laryngeal botulinum toxin injection were prospectively enrolled. Their pre-procedure and procedural vital signs were obtained and compared. The study parameters were systolic and diastolic blood pressure, heart rate, and oxygen saturation. These were then evaluated for statistically significant alterations. Additional data obtained included the number of previous injections and the presence or absence of cardiovascular comorbidities.

Results: Sixty-seven patients have been examined and comparisons made using median and paired t-tests for heart rate and blood pressure, while the McNemar analysis was utilized for oxygen saturations. There were statistically significant increases in mean heart rate (3.4 beats per minute, p=0.013), systolic blood pressure (5.9mmHg, p=0.002), and diastolic blood pressure (6.4mmHg, p=0.0004). Oxygen saturation was not affected. There were no adverse events.

Conclusion: Patients undergoing transcervical laryngeal botulinum toxin injections demonstrated increases in their heart rate and blood pressure that are numerically significant, but are sufficiently small so as not to be associated with any expected clinical compromise. Variances of this degree have not been linked to adverse events in previous literature. We may therefore continue to expect no predictable hemodynamic adverse outcomes during this procedure.
LONG-TERM OUTCOMES OF LIPOINJECTION FOR VOCAL FOLD AUGMENTATION

Authors: R. Jun Lin; Libby Smith; VyVy Young; Clark A Rosen

Institution: University of Pittsburgh Medical Centre

Presenter: R. Jun Lin

Objective: Lipoinjection has been suggested for short-term augmentation but doubts about long-term efficacy persist. Success rate has been reported at 63%-100%. These studies do not include long-term follow-up or patient perception of voice handicap. Our study sought to evaluate long-term voice handicap of patients following lipoinjection.

Method: Patients who underwent lipoinjection for vocal fold paralysis/paresis (VFPP), atrophy (VFA) and scar (VFS) with a minimum of 12 months follow-up were retrospectively reviewed. Patient demographics, VHI-10 scores, subsequent surgery, and clinical course were analyzed.

Results: 32 patients met inclusion criteria (18 VFPP, 9 VFA, 5 VFS). Average age was 58±14 years. Median duration of follow-up was 18 (range 12 to 60) months. The study cohort had significant improvement in VHI-10 scores at end point (16.6±8.2) compared to baseline (25.8±6.1, p < .001). The change in VHI-10 was the most pronounced in VFPP (-11.4±10.4, p=.0013), but was not significant in VFA and VFS (-7.0 ± 6.9, p=.07 and -5.0 ± 4.5, p=.38). Additional surgery rates were 33%, 56% and 66% for VFPP, VFA and VFS, respectively. The mean duration between lipoinjection and additional procedure was 15±11 months, which was not significantly different among the 3 subgroups. Revision surgery resulted in no further improvement in VHI-10 in all patient subgroups.

Conclusion: Lipoinjection is an efficacious, long-term procedure for VF paralysis/paresis but not for atrophy or scar. Further revision resulted in no improvement of voice handicap. Our findings are comparable to long-term results of CaHA VF augmentation and thyroplasty.
CORDOTOMY BY COBLATION IN BILATERAL VOCAL FOLD IMMOBILITY

Authors: Michael S. Benninger; Roy Xiao; Kyra Osborne; Paul C. Bryson

Institution: Cleveland Clinic

Presenter: Roy Xiao

Objective: Bilateral vocal fold immobility (BVFI) is a potentially fatal condition requiring prompt diagnosis and treatment. While the gold standard treatment uses the CO$_2$ laser in transverse cordotomy, the coblator, a minimally invasive, low thermal technology, has been increasingly used in otolaryngology. The purpose of this study was to investigate the outcomes associated with the use of coblation to treat BVFI.

Method: A case series of all patients with BVFI who underwent cordotomy by coblation at a single tertiary-care institution from 1/2012-8/2016 was conducted. Clinical, operative, and health status measure data for all patients were reviewed. Quality of life (QOL) was measured by the EuroQol 5-Dimensions (EQ-5D), and the Voice Handicap Index (VHI) measured vocal cord function.

Results: Twenty-two patients were included and followed for a median of 8 months postoperatively. Median age was 63 years with 73% females. The etiology of BVFI included prior thyroidectomy (36%) and prolonged intubation (18%). Median length of surgery was 20 minutes; median total OR time was 58 minutes compared to 87 scheduled OR minutes (p<0.01). Thirty-six percent of patients developed granulation tissue postoperatively. The EQ-5D trended towards improvement postoperatively (0.762 to 0.794, p=0.50), as did the VHI (68 to 50, p=0.08); among its individual elements, the VHI emotional component significantly improved after cordotomy by coblation (18 to 10, p=0.04).

Conclusion: Initial outcomes of cordotomy by coblation reveal this technique to be a safe and efficient approach to treating BVFI. Both QOL and vocal cord function trended towards significant improvement over follow-up.
ACUTE UNILATERAL VOCAL FOLD PARALYSIS: A CASE REPORT AND REVIEW OF LITERATURE

Authors: Anni Wong; Derrick Tint; Ahmed Soliman; Nausheen Jamal

Institution: Temple Head and Neck Institute

Presenter: Derrick Tint

Objective: To present a case of unilateral vocal fold paralysis (VFP) after injection of cocaine and heroin into the neck and to discuss potential pathophysiologic mechanisms and management options of acute VFP secondary to injection injury.

Methods/Case Description: We report a case of acute unilateral VFP and a review of the literature. The patient is a 33 year-old female intravenous drug user who presented with hoarseness and dysphagia shortly after injection of intravenous cocaine and heroin into her left lateral neck. Her airway was stable. Flexible fiberoptic laryngoscopy demonstrated an immobile left true vocal fold in the paramedian position. Computed tomography revealed edema of the left carotid sheath. Swallow evaluation showed moderate dysphagia with impaired oral and pharyngeal phase and signs of aspiration with all oral intake.

Results: Only a handful of cases of VFP after cervical intravenous drug injection have been reported, last of which was documented in 1990. A comparison between management of the current case and management of previous cases is shared. After 72 hours of observation with no improvement in symptoms, the patient underwent direct laryngoscopy with left vocal fold injection of calcium hydroxylapatite with adequate medialization. Repeat swallow evaluation demonstrated improvement of oropharyngeal dysphagia with no signs of aspiration on oral intake and improved dysphonia.

Conclusion: Although uncommon, VFP is a potential complication of cervical intravenous drug injection that should be recognized by the otolaryngologist. Early management of acute unilateral VFP with vocal fold injection medialization may prevent airway and swallow-related complications.
MANAGEMENT OF SUBGLOSSIC STENOSIS DURING PREGNANCY WITH IN-OFFICE STEROID INJECTIONS

Authors: Grace Baik; Robert Browning; Michael I Orestes
Institution: WRNNMC
Presenter: Grace Baik

Objective: To describe our experience with in-clinic serial intraleosnal corticosteroid injections to treat idiopathic subglossic stenosis in pregnant women.

Method: The outcomes from three sequential pregnant patients with idiopathic subglossic stenosis were evaluated after treatment with in-clinic intraleosnal corticosteroid injections.

Results: Three women presenting with stridor diagnosed with subglossic stenosis each underwent a series of five injections. This caused symptom improvement and increased airway control in all patients throughout the term of their pregnancy. There were no complications or long-term sequelae, and all women were able to continue their pregnancies without need for anesthesia or surgery.

Conclusion: Our evidence supports the usage of serial intraleosnal corticosteroid injection as a low-risk, safe method of managing idiopathic subglossic stenosis in pregnant women with symptomatic improvement.
OUTCOMES AFTER ENDOSCOPIC MANAGEMENT OF POSTERIOR GLOTTIC STENOSIS IN ADULTS

Authors: Michael Loochtan; Ricardo Villarreal; C. Blake Simpson

Institution: UT Health San Antonio

Presenter: Michael Loochtan

Objective: To further characterize posterior glottic stenosis (PGS), its endoscopic management and outcomes.

Methods: A surgical database and the electronic medical record from January 2009 to July 2016 were reviewed to perform a retrospective case series at a tertiary academic institution.

Results: Forty-eight patients (27 women, 21 men) were included. Twenty-three patients were diagnosed with isolated PGS and 25 with multilevel stenosis involving the posterior glottis in combination with the supraglottis, subglottis, or trachea. Mean clinical follow up was 38 months (range 0-135, median 25). Sixty-three percent of patients were tracheotomy-dependent pre-operatively, and 38% post-operatively. An average of 4 procedures was performed (range 1-26, median 3). The average interval from the first procedure to decannulation was 16.5 months. Patients with cardiorespiratory co-morbidities and/or diabetes were less likely to be decannulated (p = 0.044). There was a mean decrease in VHI-10 and EAT-10 scores of 6.4 and 4.0, respectively (p=0.075, 0.238). When compared to isolated PGS, patients with multilevel stenosis were predominantly women, more likely to have an autoimmune etiology, and required more procedures (p=0.004, 0.014, and 0.030, respectively).

Conclusion: To date, this report represents the largest series of PGS management in adults. Endoscopic management is possible; however PGS remains a difficult problem to treat. The number of required procedures was associated with the etiology. Accordingly, patients with isolated PGS underwent fewer procedures than those with multilevel stenosis. Patients with cardiorespiratory co-morbidities and/or diabetes were decannulated less frequently.
**Objective:** Tracheocutaneous fistula (TCF) is a recognized sequela of tracheostomy occurring in 13 to 43% of pediatric patients following decannulation. Due to the shift in indications for tracheostomy in children from acute to more chronic causes, the average time to decannulation has risen over the past four decades. The objective of this study was to determine whether the risk of developing a TCF increases with longer tracheostomy dependence times.

**Method:** A retrospective chart review was conducted for all children who both received a tracheostomy and were decannulated between 2002 and 2011 at a tertiary children’s hospital. Charts were analyzed for duration of tracheostomy and evidence of TCF up to 12 months post-decannulation. Data for these criteria was available on 164 out of 182 patients.

**Results:** A significant difference in the duration of tracheostomy dependence between children with and without resultant TCF was determined by the Wilcoxon rank test (P = 0.0003). The relative risk of a persistent TCF was significantly increased when the duration of tracheostomy dependence was greater than 24 months (RR = 2.5217, P < 0.005) when compared to those decannulated before 12 months. The mean tracheostomy dependence times for children with and without TCF were 33.1 and 23.4 months, respectively. Overall, 94 children (57.3%) developed a TCF.

**Conclusion:** To our knowledge, this study represents the largest collection of data for children who have been decannulated following tracheostomy placement. These data demonstrate that the risk of developing a TCF increases with longer tracheostomy dependence times in children.
ENDOBRONCHIAL ULTRASOUND GUIDED TRANSORAL FINE NEEDLE ASPIRATION OF LATERAL RETROPHARYNGEAL LYMPH NODE

Authors: Grace Baik; Erik C Osborn; Kate Kinnaird; Justin Olsen; Michael I Orestes

Institution: Walter Reed National Military Medical Center

Presenter: Grace Baik

Objective: To describe a novel technique to allow for fine needle aspiration of retropharyngeal lymph nodes at the level of the skull base using sinus navigation system and endobronchial ultrasound equipment (EBUS).

Methods: A 30-year old woman with a history of papillary thyroid cancer (PTC) status post total thyroidectomy and radioactive iodine ablation had a persistently enlarged left sided node of Rouvier, posterior to the torus tubarius. Inadquate sampling had been obtained previously with CT guided transfacial and transoral approaches. A sinus navigation system and an endobronchial ultrasound sample the lymph node while allowing good visualization of the internal carotid artery.

Results: The patient’s FNA results from the passes made with EBUS returned as adequate and positive for metastatic PTC.

Conclusion: Endobronchial ultrasound (EBUS) combined with use of a sinus navigation system allows for proper visualization and access of masses which would otherwise be difficult to biopsy via a transoral approach. This method, which has not previously been described in the literature, allows for adequate sampling without the morbidity and risks of an open biopsy when there is concern for malignancy. This technique can likely be applied to any area of the head and neck that is close to the aerodigestive tract but is otherwise difficult to reach.
HORSE BITE CRUSH INJURY TO THE LARYNX: A CASE REPORT

Authors: Michael Yim; Nadia Mohyuddin

Institution: Baylor College of Medicine

Presenter: Michael Yim

Objective: We present the unique case of a 56-year-old avid horseback rider who sustained a horse bite crush injury to the larynx and perform a literature review.

Case report: This is the first reported case in the literature of a horse bite injury to the head and neck area. Upon presentation, the patient initially underwent an emergent cricothyroidotomy and chest tube placement by the general surgery service. Once stabilized, the Otolaryngology service was consulted for further management. Examination was notable for no significant skin injuries, however triple endoscopy and subsequent neck exploration revealed complete transection of the sternocleidomastoid muscle along with extensive laryngeal framework injuries including comminuted fracture of thyroid cartilage with through and through mucosal injury at the glottis involving the anterior commissure. He subsequently underwent ORIF of the thyroid cartilage with laryngeal stent placement and revision tracheostomy. The stent was subsequently removed three weeks later. Two months later, he was noted to have a persistent anterior commissure granuloma which was subsequently excised in the OR. Three months after his injury, he was decannulated with a widely patent airway and only mild dysphonia as the remaining sequelae from his injury.

Conclusion: Carnivorous animals are involved in the vast majority of bite attacks on humans, whereas herbivores seldom show this aggressive behavioral pattern. In addition, bite injuries from animals are typically associated with deep lacerations and vascular injuries, however in this case the patient presented with a crush injury secondary to the blunt occlusion of a horse’s bite.
ANALYSIS OF COMPUTERIZED TOMOGRAPHY (CT) HEAD & NECK IMAGES IN YOUNG CHILDREN: PREVENTION OF ASPIRATION AND CHOKING INJURIES

Authors: Nicholas M. Milkovitch; Scott M. Milkovitch; Mary P. Harty; Heidi H. Kecskemethy; Jessica R. Levi; James S. Reilly

Institution: Nemours Dupont Hospital for Children

Presenter: Nicholas Milkovich

Objective: Regulatory criteria to prevent aspiration and choking injuries (16 CFR 1501), the Small Parts Test Fixture (SPTF), is based on estimated dimensions of the airway in children and limited foreign bodies (FB) data. Recent, FB studies have suggested that this standard is not adequate [1]. Now, Computerized Tomography (CT), gathers detailed, dimensional anthropometric data for young children; permitting more robust standards for injury prevention.

Methods: We conducted a 3-year (2011-2014) review of CT data of Head/Neck for 100+ infants and children, (6 months to 6 years), stratified by age, to measure anatomical landmarks (oral cavity, pharynx, and larynx). CT scans were selected for normative anatomy and BMI.

Results: Over one-hundred Axial CT radiographs were reviewed. Measurements of: 1) length of hard palate, 2) edge of hard palate to C-2 vertebrae, 3) ratio of hard palate to soft palate, 4) soft palate to posterior pharyngeal wall, 5) inter-tonsillar distance, 6) larynx dimensions (diameter and width), and 7) larynx dimensional ratio were compared, and analyzed as a function of age and gender. No difference was noted with gender; however, a predictable linear trend of increasing dimensions with age was noted, including statistical estimates of the 5<sup>th</sup> and 95<sup>th</sup> percentiles.

Conclusion: Data continues to support revision of the SPTF and the use of computerized imaging techniques to enhance safety for choking hazards in children, less than 3 years of age.

Keywords: Choking; Aspiration; FB Injury Prevention; Small Parts Test Fixture; Larynx Level of Evidence: 4
KILLIAN-JAMIESON DIVERTICULUM PRESENTING AS UNILATERAL VOCAL CORD PARESIS: A RARE OTOLARYNGOLOGIC FINDING WITH AN ATYPICAL PRESENTATION

Authors: Daniel B Noel; Michelle Ziebarth; Jan Kasperbauer

Institution: Mayo Clinic, Rochester, Minnesota

Presenter: Daniel Noel

Objective: Describe the first reported case of a Killian-Jamieson (KJ) diverticulum presenting as unilateral vocal cord paresis and provide an updated literature review on KJ diverticula.

Method: A 50 year old female was referred with dysphonia, unilateral vocal cord paresis, and a suspected thyroid mass. Subsequent workup revealed a KJ diverticulum in which symptoms and vocal cord paresis resolved after surgical management. A literature review using the terms “Killian-Jamieson” and “Killian-Jamieson diverticulum” was performed using the PubMed database.

Results: A pre-operative ultrasound and barium esophagram raised suspicion for an esophageal diverticulum. Direct laryngoscopy and surgical exploration revealed a KJ diverticulum and a transcervical excision of the diverticulum resulted in resolution of the patient’s dysphonia and vocal cord paresis, confirmed by post-operative flexible endoscopy. A literature review revealed 33 publications, with 15 cases for which management was described. These diverticula are often mistaken for thyroid masses and often present with dysphagia. Surgical intervention results in a high success rate with minimal complications. A transcervical approach is favored given the close proximity of these diverticula to the recurrent laryngeal nerve, although endoscopic approaches have also been performed with success.

Conclusion: Vocal fold paresis may be associated with KJ diverticula due to the anatomical proximity of these diverticula and the recurrent laryngeal nerve. Vocal fold immobility may improve with surgical intervention provided nerve integrity is maintained. Current published literature suggests a satisfactory success rate with surgical intervention and supports surgical management for KJ diverticula.
LONGTERM VOCAL OUTCOME FOLLOWING SUPRACRICOIDPARTIAL LARYNGECTOMY WITH CRICOHYOIDOEPIGLottoPEXY FOR LARYNGEAL CANCER

Authors: Satoru Miyamaru
Institution: Kumamoto University
Presenter: Satoru Miyamaru

Objective: To assess long term vocal outcome in laryngeal cancer patients following supracricoid partial laryngectomy with cricohyoidoepiglottopexy (SCL-CHEP).

Method: Sixteen consecutive patients who underwent SCL-CHEP for laryngeal cancer in our department from Jan 2007 to May 2015, have been reviewed. All patients were male and their median age was 61 years old (56-74yo). Median postoperative follow-up was 64 months (range, 17-100mo). We examined maximum phonation time (MPT), mean airflow rate (MFR), and voice intensity for aerodynamic parameters. Voice-related quality of life (V-RQOL) was used for a self-assessment questionnaire. Perceptual GRBAS scale was scored by a professional speech pathologist. To assess the temporal changes of these parameters, we set three evaluation terms as following; i) within 12th month, ii) between 13th to 36th months, and iii) later than 37th month after surgery. Among sixteen patients, we could obtain data fully from all the terms in ten patients and they were involved for the present study.

Results: In comparison of evaluation terms i) and iii), the mean values of MPT, MFR, and G and B scores of GRBAS scale improved significantly (P < 0.05, P < 0.05, P < 0.01, P < 0.01, respectively) over time after surgery. The mean value of V-RQOL was significantly better at term iii) than at term ii) (P < 0.05).

Conclusion: Some of the examined parameters in the present study demonstrated statistical significant improvement over time possibly by self-adaptation to new shaped glottis after SCL-CHEP.
We present a case of taser probe fired into the soft palate. The patient presented with sore throat and dysphagia after being tased in the roof of his mouth during an altercation. A piece of wire was visible in the soft palate while the rest of the foreign body was not. CT angiography revealed a long metallic foreign body behind the soft palate and was negative for carotid injury. The foreign body, a 3-cm taser probe, was removed under local anesthesia without complications. In patients with penetrating soft palate injury, ascertaining the great vessels are intact is an important part of the work-up.
A026

ACTINOMYCES AND GRANULICATELLA CHONDritis OF THE CRICOID CARTilage

Authors: Phillip Lee; Katherine Kendall

Institution: University of Utah

Presenter: Phillip Lee

Objective: Actinomycosis of the larynx is a rare entity with very few reported cases in literature. We report a case of cricoid chondritis secondary to Actinomyces and Granulicatella infection and discuss management options and the utility of PET-CT in the diagnosis and surveillance of disease.

Methods: Presenting symptoms, physical exam findings, imaging, intraoperative findings, and pathologic examination of a patient with cricoid chondritis secondary to Actinomyces and Granulicatella infection.

Results: A 24-year-old male with a history of previous inhalation injury presented with a recurrent subglottic granuloma causing dyspnea and hoarseness. Initial management included surgical excision; however the patient developed recalcitrant subglottic stenosis that persisted despite multiple attempts to balloon dilate the airway. CT revealed diffuse enlargement of the cricoid cartilage. MRI demonstrated enlargement of the cricoid cartilage with increased T2 signal with surrounding fat stranding. PET scan revealed hypermetabolic activity. The patient was underwent tracheostomy, direct laryngoscopy and biopsy. Pathology revealed granulation tissue and fibrosis and tissue cultures grew out Actinomyces odontolyticus and Granulicatella adiacens. The patient was started on a six-week course of IV penicillin and gentamicin followed by one year of oral doxycycline. Disease regression was monitored with indirect laryngoscopy and subsequent PET scans which demonstrated resolution of the hypermetabolic activity.

Conclusion: Cricoid chondritis secondary to Actinomyces and Granulicatella infection is a rare entity that can present as recurrent granulomas and subglottic stenosis. Treatment requires long-term antibiotics. PET-CT is a useful tool in monitoring disease regression.
CAN YOU PLEASE STOP COUGHING? COUGH SUPPRESSION THERAPY FOR TREATMENT OF CHRONIC COUGH

Authors: Lauren F Tracy; Katherine Adams; Elizabeth Ramsay; Rupali N Shah; Robert A Buckmire

Institution: University of North Carolina Voice Center

Presenter: Lauren Tracy

Objective: Chronic cough (CC) is a ubiquitous, challenging condition that often persists despite medical management. Cough suppression therapy (CST) offers alternative patient-specific, behavior-based treatment. The objective of this study was to investigate the immediate and short-term effects of CST in patients’ subjective cough experiences. Additionally, patient compliance and correlation of comorbidities with therapy response was evaluated.

Method: 11 patients prospectively enrolled in CST for treatment of CC >8 weeks. Pre-existing medical management was continued. CST occurred 1-2 week intervals with Cough Symptom Index (CSI) administered each session. A 1-month follow-up call assessed CSI and treatment adherence. Change in CSI was calculated, correlation with comorbidities assessed.

Results: 11 patients (10F:1M) enrolled in CST after experiencing cough for average 5.6 years (2mo-18yrs). Patients averaged 3.5 sessions (range 2-6) 1-2 weeks apart. Pre-treatment CSI averaged 20.25 (range 4-34). Patients experienced statistically significant improvements in CSI after first, second and final sessions [CSI=17.4(p =0.047), CSI=14.3(p =0.008), CSI=13.5(p =0.0003)]. Continued improvement one month after therapy trended to, but did not achieve significance (CSI=17.3,p=0.13). 50% of patients reported near daily utilization of therapy techniques. There was no correlation of studied comorbidities to CSI improvement after therapy.

Conclusion: Cough suppression therapy appears to be a meaningful adjunct to medical treatment with varied results. This patient population demonstrated improvement in CSI after first, second and final therapy sessions; this improvement was marginally sustained at 1 month. There was no association identified between CST responses and pre-treatment patient variables. A larger study is warranted to further elucidate these issues.
CLINICAL IMPLICATIONS OF REGENERATION SYNKINESIS IN UNILATERAL VOCAL FOLD PARALYSIS

Authors: Tuan-Jen Fang; Yu-Chen Pei

Institution: Chang Gung Memorial Hospital

Presenter: Wan-Ni Lin

Objectives: Synkinesis observed in the thyroarytenoid- lateral cricoarytenoid (TA-LCA) muscle complex is caused by aberrant regeneration following recurrent laryngeal nerve injuries in patients with unilateral vocal fold paralysis (UVFP). In this study, quantitative laryngeal electromyography (LEMG) and other assessments was applied in UVFP patients with synkinesis and their presentation will be compared to those without synkinesis.

Methods: One hundred and four patients diagnosed with UVFP with the duration from disease onset to LEMG more than 6 months were recruited. The outcome measurements included LEMG, quantitative LEMG analysis of TA-LCA muscle complex, glottal gap measured by videostroboscopy, voice-related quality of life and voice acoustic analysis.

Results: Among the recruited patients, eight (8%) had synkinesis and 96 (92%) did not. The majority of patients in the synkinesis group were caused by non-surgical etiologies while those in the non-synkinesis group by surgery. Patients in the synkinesis group had higher TA-LCA turn frequency (p < 0.001) and higher probability of dysfunction of cricothyroid muscle (p=0.04), and better voice-related quality of life (p = 0.01) than those without synkinesis. General life quality measurement, glottal gap or parameters in acoustic analysis showed no significant different between groups.

Conclusions: In patients with UVFP, those with synkinesis are mostly caused by non-surgical etiologies and have higher TA-LCA turn frequency compared to those without synkinesis, a finding that is compatible to the mechanism of aberrant reinnervation. UVFP with synkinesis is a special subtype of UVFP that has higher incidence of cricothyroid muscle dysfunction and better voice outcome.
ORAL HPV INFECTION AND HIGH RISK SUBTYPES IN RECURRENT RESPIRATORY PAPILLOMATOSIS

Authors: Aaron L Thatcher; Norman D Hogikyan; Thomas E Carey

Institution: University of Michigan

Presenter: Aaron Thatcher

Objective: Oral HPV infection is common in the US population, and is more frequent in recurrent respiratory papillomatosis (RRP) patients. Oral infection with high risk HPV (hrHPV) types has been increasing. We studied oral HPV infection in RRP and the rate of hrHPV types in RRP to better understand current trends.

Method: Adult and pediatric patients scheduled for papilloma debridement were recruited to provide oral samples. All patients underwent biopsy of normal larynx mucosa and papilloma. Adult patients and their partners completed an epidemiologic survey assessing HPV risk factors. HPV detection and typing from all oral and laryngeal samples was performed by two methods: L1 PGMY PCR, and ultra-sensitive MassArray testing.

Results: Twenty-one adult subjects, 9 partners, and 10 pediatric subjects consented to the study. HPV types 6 (70%), 11 (26%), and 16 (15%) were detected in papilloma specimens. HrHPV was detected in papilloma biopsies of adult onset (AORRP) and juvenile onset RRP (JORRP) patients. Oral HPV rate was 16%. One couple had congruent oral HPV16 infection. Only 1 of 4 patients with oral infection and laryngeal papilloma had congruent type. AORRP patients have average of 14.29 lifetime oral sex partners; JO patients have average of 1.33. p = 0.03. AORRP symptoms started an average of 17 years after first reported oral sex encounter.

Conclusion: Oral HPV infection is common in RRP but may be unrelated to the laryngeal disease. High risk types are becoming more common in RRP. Epidemiologic trends in AORRP are confirmed in this study.
SUPRAGLOTTIC FOREIGN BODIES: A REVIEW OF TWO DENTURE CASES

Authors: Tyler Bliss; Jason Talmadge; Christopher Bingcang

Institution: University of Nebraska Medical Center

Presenter: Tyler Bliss

Objective: Review two cases of dentures as supraglottic foreign bodies in patients seen at our institution while undergoing workup for dysphagia and subsequently found to have partial dentures in the pharynx.

Method: A review of two cases at our institution.

Results: Two patients were seen urgently by the otolaryngology team after discovery of foreign body in pharynx incidentally on radiography. These patients were taken to the OR and extraction of the foreign bodies were performed under moderate IV sedation and found to be partial dentures. In both of our cases there was a delay in ENT consultation due to ambiguous presenting symptoms. Both patients had a mild/moderate degree of mental impairment. On further discussion it was noted that both patients reported to their caregivers that the dentures were missing several days prior to the discovery in the pharynx, but this was not extensively investigated. The key to early recognition is awareness of the hazard of supraglottic migration both by denture wearers and clinicians.

Conclusion: Dentures are commonly used prosthetic devices to aid in mastication, aesthetics, and pronunciation. Complications with denture use are few, the most notable being denture stomatitis. However, there is potential in some patients for the denture to become dislodged into the oropharynx or supraglottic area. It is important that both patients with dentures and clinicians be aware of the possibility of denture migration so that early diagnosis and extraction can be performed.
POST-OPERATIVE PAIN IN SLEEP SURGERY: A NEW ERA

Authors: Nicholas Scalzitti; Dale Capener; Peter O’Connor

Institution: San Antonio Military Medical Center

Presenter: Nicholas Scalzitti

Objective: Our review investigates the anesthetic and post-operative management of 16 consecutive patients undergoing implantation of an upper airway stimulation system for treatment of obstructive sleep apnea. The peri-operative course of each patient was reviewed to assess for discharge timing, pain scales, and narcotic pain medication use.

Method: A retrospective review of consecutive surgical patients implanted at our institution with an upper airway stimulation system was conducted. Subjects were all patients who were previously intolerant of positive airway pressure therapy for obstructive sleep apnea. Subjects’ pre-operative anesthesia records, operative logs, and post-operative records were reviewed to identify narcotic use, discharge timing, and pain scales.

Results: Surgery for obstructive sleep apnea was performed by implanting an upper airway stimulation system in combination with a narcotic-sparing, multimodal anesthetic technique. Sixteen patients, ages 45 to 82, were implanted. Six patients reported pain scale scores of 0 out of 10 for their entire post-operative course, and no patient reported using narcotic pain medicine after post-operative day 3. Ten of the last 12 patients were discharged home the same day of surgery. No significant post-operative complication or morbidity was identified.

Conclusion: Surgery for obstructive sleep apnea that involved implantation of an upper airway stimulator system along with enhanced pain management techniques both before and during surgery substantially reduced the need for post-operative narcotic use. Same day discharge also became feasible. This represents a significant difference versus traditional sleep surgery with pharyngeal reconstructive techniques.
IN-VIVO FERRET VOCAL FOLD SCAR MODEL FOR INJECTION LARYNGOPLASTY

Authors: Haruka Takamura; Yoshihiko Kumai; Yutaka Toya; Kohei Nishimoto; Shinobu Furushima; Eiji Yumoto

Institution: Kumamoto university

Presenter: Haruka Takamura

Objective: To validate ferret vocal fold (VF) scar model for injection laryngoplasty in comparison with rat and rabbit larynges anatomically and histologically.

Method: Sixteen adult young male ferrets (scar model at 4 weeks (n=10) and 16 weeks (n=6)), five excised female wistar rat and five excised rabbit larynges respectively, were used. Originally designed surgical table for ferret laryngo-microsurgery which has flexible arm connected to nasal speculum was prepared for exposing VFs. Right entire VF was electro-cauterized and the larynges were harvested at 4 and 16 weeks. Also, colored ink injection to bilateral lamina propria (LP) layers were performed. Histological analysis (HE, Alcian-blue, Elastica-van-Gieson (EVG), and immunostaining for collagen type 1, collagen type 3, and fibronectin) and anatomical analysis (measuring the ratio of length of membranous portion per cartilage portion) were performed.

Results: Anatomical measurements confirmed that ferret VFs are proportionally similar to human rather than to rabbit and rat. Laryngoscopic exposure of VF was easily obtained and colored ink injection into the LP layer of normal and scarred VF was achieved with needle confirmed histologically. Reduction of hyaluronic acid and increased collagen bundles were observed in the scarred LP at 4 weeks and these observations were more evident at 16 weeks. Increasing of collagen type I, III and fibronectin positive area were observed in the scarred LP compared with the untreated side both at 4 and 16 weeks.

Conclusion: Present study validated the in-vivo ferret VF scar model for injection laryngoplasty.
AUGMENTED REALITY OF LARYNGEAL AND TRACHEOBRONCHIAL INJURY: A NEW PREOPERATIVE IMAGING MODALITY

Authors: Matthew R Naunheim; Kevin Wong; Osama Tarabichi; Elliott D Kozin; Phillip C Song

Institution: Massachusetts Eye and Ear Infirmary

Presenter: Matthew Naunheim

Objective: Augmented reality (AR) combines real-world visual information with computer-generated inputs such as sounds, text, and graphics. The purpose of this study was to utilize recent advancements in AR to create interactive virtual anatomic models of complex tracheobronchial injury (TBI) that may be useful in preoperative planning.

Method: Computed tomography (CT) images in DICOM format of patients with laryngeal and tracheal fractures were opened in 3D Slicer (www.slicer.org) and volume rendered into a three-dimensional (3D) surface mesh. The 3D models were exported onto a virtual game environment using the Unity 3D game engine (Unity Technologies, San Francisco, CA) and projected into augmented reality using Vuforia software development kit (Needham, MA). Vuforia software development kit stereoscopically projected laryngotracheal models in real space based on the user’s orientation towards real world images. Final data was exported onto a smartphone fitted in a highly portable virtual reality viewer (Unofficial Cardboard, La Jolla, CA).

Results: The construction of AR environment was achieved in which a user enters an augmented reality environment and views the 3D projection of a patient’s laryngotracheal fractures, with good differentiation of soft tissue and cartilage. The user is capable of moving, rotating, and clipping through layers with the resolution of a CT scan.

Conclusion: Using readily available open-source software, we successfully developed an AR environment that allows surgeons to visualize laryngeal and tracheobronchial injury. Implications for this technology include pre-operative planning, medical education, and surgical simulations.
IDEAL CHARACTERISTICS OF A LASER-PROTECTED ENDOTRACHEAL TUBE – ABEA MEMBER SURVEY RESULTS AND BIOMECHANICAL TESTING

Authors: Aaron D. Friedman; Mihir K Bhayani; Mark E. Gerber; Kanav Kumar; Aobo Ma; Yupeng Ren; Li-Qun Zhang

Institution: NorthShore University HealthSystem

Presenter: Mark Gerber

Objective: To determine the characteristics of laser-protected endotracheal tubes (LPET’s) that are valued by otolaryngologists who perform laser surgery in the head and neck, and to measure the stiffness of current and past LPET’s.

Method: An online questionnaire was completed by American Broncho-Esophagological Association (ABEA) members. In addition, distal end LPET compliance was measured using a precision linear actuator. The compressive force-displacement curve was established to determine tube stiffness.

Results: 371 ABEA members were emailed and 83 (22%) completed the survey. Respondents highly valued the following LPET characteristics, which were properties of the Medtronic Laser Shield II tube (MLST): a cuff that is tight to shaft when deflated, a tube that is as soft and flexible as possible, and a tube surface that is as smooth as possible (all p < 0.01). They did not value a tube having more than one cuff (p = 0.0175). Prior to industry-driven discontinuation of the MLST, 74% of survey respondents reported using it; 9 months after the end of its production, 18% reported still using it (p < 0.01), and the majority of respondents (68%) were now using the stainless steel, Mallinckrodt Laser-Flex tube (MLFT). 64% of respondents did not consider cost being a factor in LPET choice. In biomechanical testing of LPET’s, the MLST was 3.45 times more compliant than the MLFT (p < 0.01).

Conclusion: ABEA members highly value distinguishing properties of the now discontinued MLST, and the current most popular alternative LPET, the MLFT, has none of them.
CHYLOMICRON-MEDIATED TRAFFICKING OF DIETARY VITAMIN A TO THE RAT VOCAL FOLD

Authors: Kohei Nishimoto; Christopher R Davis; Sherry A Tanumihardjo; Diane M Bless; Nathan V Welham

Institution: University of Wisconsin

Presenter: Kohei Nishimoto

Objective: The essential nutrient vitamin A (VA) is a potent regulator of multiple biologic processes. Most systemic VA is stored in hepatic stellate cells (SCs) and trafficked to extrahepatic target organs (including the larynx) in via retinol-binding protein (RBP). Alternatively, VA can bypass the liver and be trafficked directly to extrahepatic organs by chylomicra. Chylomicron-mediated VA transport can be evaluated via detection of alpha-retinol (aR), a VA isomer that cannot bind to RBP and therefore cannot be released from hepatic storage. The purpose of this study was to determine whether VA can be transported to the vocal fold mucosa via RBP-independent chylomicra, via aR dosing in a rat model.

Method: VA-sufficient rats (n=120) were dosed with 2 mg aR acetate; control rats (n=5) received vehicle only. Vocal folds, liver, and various extrahepatic organs were harvested at 7 h and 72 h; sera were collected at 9 time points from 0-72 h. Samples were analyzed using ultra-performance liquid chromatography to obtain VA isomer profiles and concentrations.

Results: Serum aR concentration peaked at 3 h and was metabolized by 11 h. Vocal fold, kidney, and spleen aR concentrations peaked at 7 h and decreased substantially by 72 h; lung aR concentration peaked at 7 h and decreased slightly by 72 h; liver aR concentration increased at 7 h and was maintained through 72 h.

Conclusion: Orally dosed VA can be transported to the vocal fold via chylomicra, where it is almost completely metabolized by 72 h post dose.
MEDIALIZATION THYROPLASTY WITH AUTOLOGOUS TENSOR FASCIA LATA - A NOVEL APPROACH FOR REDUCING POST-THYROPLASTY COMPLICATIONS

Authors: Tiffany N Chao; Ahmad Mahmoud; Karthik Rajasekaran; Natasha Mirza

Institution: University of Pennsylvania

Presenter: Tiffany Chao

Objective: Medialization thyroplasty is the gold-standard treatment for unilateral vocal fold paralysis, improving on voice and swallowing function and preventing life-threatening aspiration events. Some of the most commonly used laryngeal implant materials include Gore-Tex, Silastic, and hydroxyapatite, but all induce some degree of local tissue inflammatory response and carry the risk of immediate or delayed implant extrusion. This risk is greater in patients who have received chemoradiation to the neck.

Method: Here, we describe a novel approach for medialization thyroplasty, utilizing a ribbon of autologous tensor fascia lata harvested at the time of surgery and layering it within the paraglottic space in a manner similar to Gore-Tex thyroplasty. Currently, fascia lata is widely used for many applications including implanted slings for facial paralysis, with proven safety and durability. By auto-transplanting the patient’s native tissue, we hypothesize that the risks of implant extrusion and other minor complications such as local infection or transient edema will be significantly reduced.

Results: Thus far, this method has been accomplished in two patients with unilateral vocal fold paralysis, who have also had prior radiation therapy to the head and neck, with good postoperative outcomes.

Conclusion: Given the increased risk of post-operative wound breakdown and infection in irradiated patients, we believe that this new approach will lead to improved outcomes and decreased complication rates, particularly in this patient population.
SURGICAL MANAGEMENT OF AN ATRAUMATIC DISPLACED LARYNGEAL FRACTURE AFTER COUGHING

Authors: Ryan C Borek; Tiffany N Chao; Natasha Mirza

Institution: University of Pennsylvania

Presenter: Tiffany Chao

Objective: Atraumatic laryngeal fracture is extremely uncommon, with only four cases previously reported, all of which were managed conservatively.

Method: Here, we describe a case of a displaced fracture of the right thyroid lamina after an episode of coughing, presenting with hoarseness, dysphagia, and odynophagia. There was no identifiable mechanism of trauma. On initial diagnostic flexible laryngoscopy, he was found to have a hematoma in the ventricle and false vocal fold and a height mismatch between left and right vocal folds. He also had crepitus in the neck. The CT neck confirmed these findings.

Results: The patient was taken to the operating room for open reduction and internal fixation, with subsequent complete resolution of his symptoms. We prefer fixation of the fracture using non-absorbable suture, as it provides excellent re-approximation without the difficulty of plating in the thyroid cartilage with patchy calcification and malacic areas.

Conclusion: This case report highlights the importance of prompt surgical repair for displaced laryngeal fractures. Due to the difficulty of correcting vocal cord height discrepancies on an elective basis later in the course of recovery, such defects in particular, should be corrected as soon as possible to restore speech, swallowing and respiratory function.
BRIDGING THE GAP BETWEEN CLINICAL AND RESEARCH SETTINGS FOR FUNCTIONAL ASSESSMENT OF THE VOCAL FOLDS

Authors: Justin M Hintze; Astha Malhotra; David G Lott

Institution: Mayo Clinic Arizona

Presenter: Justin Hintze

Objective: To outline current functional assessment tools of vocal folds (VFs) and bridge the gap between research and clinical evaluation techniques. Functional assessment of the VFs is an important step in evaluating VF pathologies. Traditional research-based investigations have focused on histological and biomechanical characteristics of the VFs. Although the mechanical properties are fundamental to both the acoustics and biomechanics of voice production, the quantitative methods applied to characterize these differ greatly from clinical investigations. Standardization of research-based characterization and correlation with clinical tools is of marked significance for advances in therapeutics and regenerative medicine.

Method: PubMed and Google Scholar were searched using the following search terms: vocal cord, vocal fold, assessment, functional, function, investigation.

Results: The most widely used clinical instrument to functionally assess the VFs is laryngoscopy, which allows looking at structure, symmetry, and mobility. When coupled with stroboscopy, it can also visualize the glottal cycle. High-speed videography can overcome subsampling encountered with stroboscopy, and allow for determination of kymographic features, such as vibration characteristics. Acoustic analysis provides additional information, including jitter, shimmer, harmonic-to-noise ratio and fundamental frequency. Most research-based biomechanical studies are performed in-vitro or ex-vivo. These include aerodynamic studies, acoustic, glottal-airflow measurements and VF motion. Biomechanical testing involves force-elongation, shear measurements, viscoelasticity and indentation.

Conclusion: Functional assessments of VFs used in the research setting have not been standardized and different methods are not comparable. These analyses cannot be applied in-vivo for clinical settings. More consistent methodologies combining research and clinical approaches will provide the most clinically-appropriate insight.
OFFICE-BASED FLEXIBLE ENDOSCOPIC CARBON DIOXIDE LASER DAY SURGERY FOR LARYNGEAL DISEASES

Authors: Koji Araki; Masayuki Tomifuji; Hiroshi Suzuki; Yuya Tanaka; Shingo Tanaka; Kosuke Uno; Yoichiro Takahashi; Yurina Nakamori; Syotaro Hirokawa; Akihiro Shiotani

Institution: National Defense Medical College

Presenter: Koji Araki

Objective: Carbon dioxide laser (CO2 Laser) is useful device for laryngeal surgery. It has been used in microlaryngeal surgery under general anesthesia in many cases. Recently, fiber guide CO2 Laser became commercially available. Guide fiber can be manipulated through the guide channel of flexible endoscopy. But the government in Japan allowed to use this guide fiber only through specialized rigid handpieces, and not allowed through guide channel of flexible endoscope. So we planned preliminary feasibility trial of office-based flexible endoscopic CO2 Laser day surgery.

Method: Patients with small laryngeal diseases were enrolled from June 2015. Indications were judged by considering the size and location of lesions. Patients were locally anesthetized and flexible endoscope (EB-1575K or EH-1990STK, Pentax) were inserted through nose. Lesions were removed using fiber forceps as much as possible, and laser evaporation was performed using guide fiber of CO2 laser (AcuPulse Duo or 40WG, Lumenis). Patients were observed 1-2 hours after procedure to confirm uncomplicated postoperative course. The protocol of this study was approved by the institutional ethical committee.

Results: Ten patients including 8 laryngeal papilloma, 1 vocal cord leukoplakia and 1 carcinoma in situ were performed 14 procedures. Three patients with papilloma were needed multiple procedures. Except only one patient with papilloma, all patients achieved disease control without additional intervention. All procedures were accomplished with no adverse event.

Conclusion: Office-based flexible endoscopic CO2 Laser day surgery is feasible with safety. This procedure has advantages especially for patients with recurrent laryngeal papilloma.
EPIDEMIOLOGICAL SURVEY OF LARYNGEAL FRACTURES IN UNITED STATES EMERGENCY ROOMS

Authors: Rosh K. V. Sethi; Maxwell Kligerman; Matthew R. Naunheim; Elliott D. Kozin; Stacey T. Gray

Institution: Massachusetts Eye and Ear Infirmary

Presenter: Rosh Sethi

Objective: There is limited data on laryngeal fracture presentation, diagnosis, and management in United States emergency departments (ED). We aim to investigate patients who are diagnosed with laryngeal fractures in the ED and identify practice patterns. Study Design: Retrospective review of the Nationwide Emergency Department Sample (NEDS) from 2009 to 2011.

Method: NEDS was queried for patient visits with a diagnosis of open or closed laryngeal fracture (ICD9CM codes 807.5 and 807.6). Patient demographics, hospital characteristics and management characteristics were analyzed.

Results: There were 3,102 ED visits with a diagnosis of laryngeal fracture during the study period. Mean patient age was 40.9 years (SEM 0.65 years). The majority of patients were male (85.5%) and sustained a closed (vs. open) fracture (91.4%). All diagnoses were related to an injury and the most common mechanism was blunt trauma (28.8%) and motor vehicle trauma (16.2%). The majority of patients were treated for more than one injury during the same visit (76.2%). Most patients were evaluated at a trauma hospital (53.9%) and were subsequently admitted (71.9%). Emergent intubation was rarely reported (2.6% of all cases) and a small minority of patients underwent fiberoptic flexible laryngoscopy in the ED (1.9%). Laryngeal fractures occurred more frequently during summer months (28.2%) and in the geographic South (36.0%). Mean ED charge was $4,957.34 (SEM 471.35).

Conclusion: This study provides contemporary analysis of epidemiological trends in laryngeal fracture trauma, injury mechanisms and management. This study has implications for ED triage and physician training.
DISPOSABLE BRONCHOSCOPE VERSUS CONVENTIONAL BRONCHOSCOPE FOR ASSISTED PERCUTANEOUS DILATATIONAL TRACHEOSTOMY IN A MEDICAL ICU: A COST COMPARISON STUDY

Authors: Andrew Robichaux; Andrew Wilhelm; Lana Jackson

Institution: University of Mississippi Medical Center

Presenter: Andrew Robichaux

Objective: A cost comparison of single-use, disposable bronchoscopes (SDB) to non-disposable, conventional bronchoscopes (CB) in a 20 bed ICU for the purpose of percutaneous, dilatational tracheostomies (PDT).

Method: ICU Bronchoscopies utilized during PDT were identified as either SDB or CB from August 2015 to August 2016, and the associated costs were compiled in Microsoft Excel. Break-even analysis was performed. Analysis was performed comparing the SDB system to the cost of therapy provided by a single CB. Our model makes the assumption that an institution is considering purchasing a new CB or the SDB system.

Results: SDB and CB performed in our ICU totaled 34 and 94, respectively. SDB unit variable costs were $274/unit with a fixed cost of $1,495 for an associated monitor. Attributable CB value was 26% of an upfront cost of $30,000/scope or $7,968.75, as determined by the ratio of SDB to total bronchoscopies performed in the ICU over one year. Service contracts for CB were $2394-2889/scope/year. Other associated CB costs/procedure were $6 for supplies and $13.53 for technician wage. SDB was cost efficient until thirty-five PDT or until $11,085 was spent.

Conclusion: SDB was cost efficient until thirty-five PDT were performed or until $11,085 was spent at our institution.
RECOVERY PROCESS OF EPITHELIAL BARRIER AND TIGHT JUNCTION AFTER TRACHEAL INJURY

Authors: Takuya Tsuji; Ichiro Tateya; Tohru Sogami; Ryo Suzuki; Tatsuya Katsuno; Yo Kishimoto; Masaru Yamashita; Koichi Omori

Institution: Kyoto University

Presenter: Takuya Tsuji

Objective: Tight Junctions (TJ) play major role in epithelial barrier. The purpose of our study was to verify the recovery process of epithelial barrier and TJ after tracheal injury.

Method: Thirteen weeks old male ICR mice were used. After exposure of the cervical trachea, a vertical incision of 3 tracheal rings in length was made with underlying epithelium in each mouse. Mice were sacrificed at the time points of 3, 4, 5 and 7 weeks after the operation. The operated sites were analyzed with immunohistochemistry for Occludin as a TJ protein, and TJ-permeability assay using a primary amine-reactive biotinylation reagent as a tracer were performed.

Results: The operation sites were almost covered with epithelium 3 weeks after surgeries. Cobble stone appearance of Occludin expression at injured sites was detected at 4 postoperative weeks. Prevention from biotinylation reagent permeation was accomplished at 7 postoperative weeks except for one case of granulation tissue formation.

Conclusion: Epithelialization at injured sites in trachea can be completed in a few weeks, but barrier functions would not be enough on this time point. More weeks were needed for the functional recovery of tight junction and barrier in our mice model.
THE Plication Technique to Enhance the Endoscopic Approach to Zenker’s Diverticulum

Authors: Harry H Ching; Alycia G Spinner; Jacob B Kahane; Robert C Wang

Institution: University of Nevada School of Medicine

Presenter: Harry Ching

Objective: Endoscopic stapler-assisted treatment of Zenker’s diverticulum leads to an incomplete division of the common wall, and the actual diverticulum size remains unchanged. Persistent dysphagia and recurrence of up to 20% have been reported. This pilot study evaluates a technique designed to directly reduce the Zenker’s diverticulum size.

Method: Patients with Zenker’s diverticulum undergoing endoscopic surgical management at a single institution in 2016 were retrospectively reviewed. After standard endoscopic stapler diverticulotomy, the sac is reduced in size by functionally decreasing the diverticulum mucosal surface area. The redundant diverticular wall is retracted and plicated endoscopically.

Results: Five patients were included with an average age of 73 years. In all patients, three to four folds of mucosa were plicated or resected with the endoscopic stapler or ligation device. Two patients had prior endoscopic stapler treatment with symptomatic recurrence at 9 months and 3 years. Mean preoperative diverticulum size was 3.0 x 1.7 x 3.6 cm (CC x AP x T). On postoperative barium swallow in 4 patients, all had reduced diverticulum size, and two patients had no further evidence of diverticulum. The mean reduction in common wall size was 87%. All patients had complete resolution of dysphagia and regurgitation. There were no complications or recurrences at a mean follow-up of 2.1 months.

Conclusion: The plication technique is a safe adjunct to standard endoscopic treatment of Zenker’s diverticulum in order to directly reduce the diverticulum sac size. The common wall was eliminated in 2 of 4 patients and significantly reduced in the others.
IN OFFICE STEROID INJECTION AS SALVAGE FOLLOWING OPERATIVE BALLOON DILATION FOR SUBGLOTTIC STENOSIS IN A PREGNANT WOMAN

Authors: Adam R Coughlin; Tyler J Willman; Seth H Dailey

Institution: University of Wisconsin

Presenter: Tyler Willman

Objective: To present a case with novel management of idiopathic subglottic stenosis during pregnancy using in-office steroid injection as salvage for airway stenosis after operative balloon dilation

Method: Case report with photo documentation.

Results: Resolution of dyspnea, improvement in severity of subglottic stenosis, and successful labor and delivery without airway distress.

Conclusion: This case highlights the challenges of airway management in a patient with subglottic stenosis during pregnancy, and is the first to demonstrate improvement in airway restriction using in-office steroid injections for salvage after return of symptoms after operative balloon dilation.

Case Report: We present a case with novel management of idiopathic subglottic stenosis during pregnancy using in-office steroid injection as salvage for airway stenosis after operative balloon dilation. A 31 year-old obese woman with an 18 month history of dyspnea was found to have 60% narrowing of the subglottic airway. She was 14 weeks pregnant. She was taken to the operating room for balloon dilation. Dyspnea worsened within six weeks. She then underwent monthly in-office transnasal injections of triamcinolone into the subglottic submucosa. She had resolution of dyspnea, and airway evaluation prior to uncomplicated term labor and delivery revealed 20% subglottic stenosis.
CHANGES IN TIMING OF SWALLOW EVENTS IN PARKINSON'S DISEASE

Authors: Breanne L Schiffer; Katherine Kendall

Institution: University of Utah

Presenter: Breanne Schiffer

Objective: The prevalence of Parkinson’s Disease (PD) increases with age. Dysphagia and subsequent aspiration pneumonia are common causes of morbidity and mortality in this population. This study assesses the timing of swallow events in patients with PD compared to historical controls in order to characterize the variations in airway closure and structural displacement that may contribute to dysphagia in this population.

Method: Sixty-two modified barium swallow studies (MBSS) in adults with PD experiencing symptoms of dysphagia were included in this retrospective chart review. One (1) cc and twenty (20) cc liquid bolus swallows were analyzed and the timing of thirteen displacement and bolus transit events was recorded. Similar measurements were obtained from forty-eight MBSS in a gender and age-matched population with no swallowing complaints.

Results: Patients with PD were slow to initiate and complete airway closure. In addition, hyoid elevation was maintained for a longer period of time in patients with PD. These findings were more pronounced for the 20 cc bolus swallows compared to the 1 cc bolus swallows.

Conclusion: Patients with Parkinson’s Disease demonstrate a delay in airway closure and relaxation of hyoid elevation during swallowing. These findings may be related to increased rigidity. The results of this study will be helpful in guiding swallow therapy for patients with this disease, emphasizing training in early and complete airway closure.
IN-VITRO COMPARISON OF ALGINATE-CONTAINING PRODUCTS FOR TREATMENT OF GERD

Authors: Ahmed Bayoumi; Matthew Kaufman; Peter Belafsky

Institution: University of California, Davis

Presenter: Ahmed Bayoumi

Introduction: Gastroesophageal reflux disease (GERD) is common and costly. Alginate and antacid combination medications have been shown to improve symptoms and healing. A comparison between different formulations has not been performed.

Objective: To critically compare various commercially available alginate formulations.

Method: We performed an in-vitro comparison of the following liquid and chewable alginate-containing antacids: 1) UK Gaviscon Original 2) UK Gaviscon Double Action 3) UK Gaviscon Advance 4) US Gaviscon Regular Strength 5) US Gaviscon Extra Strength 6) Alginate Homemade Formula. A 250 ml flask was filled with 0.1M HCL. After the addition of the alginate-containing antacid, the flask was tilted to an angle at which acid refluxed to a pre-determined endpoint. The time until raft formulation, amount of product required to raise the pH > 4, and the coherence of the raft and was measured and compared between groups.

Results: The UK Original Liquid and Chewable, the UK Double Action Liquid, and the UK Gaviscon Advance Chewable formed a consistent cohesive raft. The chewable formulations appeared to form a raft sooner than the liquid. The UK Gaviscon Original Chewable and the UK Double Action Liquid afforded the best protection against reflux (greatest angle). The amount of product required to raise the pH > 4 was least for Gaviscon Advance Liquid and US Extra Strength Liquid.

Conclusion: Differences exist among various commercially available alginate formulations in their ability to form a cohesive raft, protect against reflux, and their acid neutralizing capabilities. Advantages of each preparation are outlined.
ASSESSING DIETARY ADVANCEMENT FOR DYSPHAGIA PATIENTS AT RISK FOR ASPIRATION

Authors: Cedric Thiel; Thomas Murry; Brianna Crawley; Priya Krishna

Institution: Loma Linda University

Presenter: Cedric Thiel

Objective: Fiberoptic endoscopic evaluation of swallowing (FEES) evaluates oral intake safety by allowing direct observation of laryngeal function before and after swallowing. The purpose of this study was to delineate the impact of abnormal vocal fold mobility and altered laryngeal sensation on dietary management in hospitalized patients previously diagnosed with aspiration.

Methods: A retrospective chart review was performed for 300 FEES studies on 263 patients between June 2012 and March 2016. Data regarding laryngeal sensation (palpating the arytenoid mucosa and observing for quick vocal fold adduction), aspiration, vocal fold mobility, and pre- and post-FEES diet were collected and statistical analysis performed.

Results: Patients were significantly more likely to have aspiration during FEES when laryngeal sensation was deficient versus intact (OR=0.218, p<0.0001). When aspiration was noted, it was significantly more likely that a feeding tube was recommended after FEES (OR=4.914, p<0.0001). Patients with intact versus deficient laryngeal sensation were significantly more likely to advance their diet after FEES (OR=2.383, p<0.0001). Patients were less likely to have regression in diet when vocal fold mobility was intact (OR=0.744) versus diminished (OR=0.256).

Conclusion: FEES testing in hospitalized patients at risk for aspiration identified intact laryngeal sensation as a significant factor in predicting aspiration and diet advancement. Vocal fold mobility and presence of aspiration on FEES exam were useful in predicting the recommendation of feeding tubes. These findings have potential as predictive tools for dietary advancement and discharge planning.
MANAGEMENT OF UNILATERAL VOCAL FOLD PARALYSIS IN GERIATRIC PATIENTS: VOICE OUTCOMES

Authors: Juliana Bonilla-Velez; Mariah Small; Ozlem E Tulunay Ugur

Institution: University of Arkansas for Medical Sciences (UAMS)

Presenter: Ozlem Tulunay Ugur

Objective: Treatment outcomes in geriatric patients with unilateral vocal fold paralysis (UVFP) have not been well described. We aimed to assess voice and swallowing outcomes in this patient population.

Method: The records of 106 patients greater than 65 years old evaluated at a tertiary care voice clinic for UVFP between 2002 and 2015 were reviewed. Patient demographics, clinical characteristics, treatment, and voice and swallowing outcomes were retrieved. Patients with bilateral cord immobility, laryngeal cancer or previously treated at another institution were excluded.

Results: Mean age at presentation was 73.5 years (SD 6.3). Median time from symptoms to initial voice visit was 6 months (IQR 3-12 months). Most patients presented due to hoarseness (88.7%), while 8.5% complained of dysphagia. During evaluation, 60% were noted to have dysphagia, 4.7% had history of aspiration pneumonia. Etiology was most commonly iatrogenic (59%), mainly after thyroid/parathyroid surgery (14%) and carotid endarterectomy (11%); while 24% remained idiopathic and 15% were secondary to neoplasms. About a third of patients were treated with observation, temporary injection or permanent injection (22.6%, 27.4%, 33%, respectively). There was a statistically significant improvement in Voice Handicap Index scores after treatment (73.8 to 39.5, p=0.0001). Approximately 25% of the patients required further treatment for dysphagia and 12.2% needed a feeding tube.

Conclusion: Geriatric patients with UVFP pursue medical attention mainly due to voice problems, which significantly improve with treatment. Swallowing complaints on the other hand, need to be sought out by otolaryngologists and managed aggressively.
EPIDEMIOLOGY OF LARYNGEAL DISEASES IN TAIWAN: A NATIONWIDE DATABASE STUDY

Authors: Ying-Ta Lai¹; Seth Dailey²; Yuan-Hung Wang¹; Yu-Chun Yen¹; Tzu-Yun Yu¹; Pin-Zhir Chao¹; Fei-Peng Lee¹

Institutions: Taipei Medical University; ²University of Wisconsin-Madison

Presenter: Ying-Ta Lai

Objective: Critical to the study of disease burden is disease epidemiology. For laryngologists, the epidemiology of laryngeal diseases is not easy to study due to a dearth of large population databases.

Method: We used the Taiwanese National Health Insurance Research Database from 2006 to 2013, which contained 25% of the random sampling population. ICD-9 voice, swallowing, airway and gastroesophageal reflux disease codes were selected and queried. The age queried was 20 to 90 years old. The total population was 1,708,423. The geographic locale where the diagnosis was made was recorded.

Results: The mean age of voice, swallow, airway and gastroesophageal reflux diseases are 49.2, 54.6, 56.4 and 50.6 respectively. Female patients predominate in voice and gastroesophageal reflux diseases, whereas male patients are more in swallow and airway diseases. Patients in urban area tend to have voice and gastroesophageal reflux diseases. The three most common voice related diseases were Other diseases of vocal cord or larynx (478.5), Acute laryngitis (464.0), Upper respiratory tract hypersensitivity reaction, site unspecified (478.8). The three most common dysphagia related diagnoses were Dysphagia (787.2), Psychogenic gastrointestinal malfunction (306.4) and Other specified iron deficiency anemia (280.8). The three most common airway related diagnoses were Other diseases of trachea and bronchus, not elsewhere classified (519.1), Tracheostomy complications, unspecified (519.00) and Other tracheostomy complications (519.09).

Conclusion: This study represents the largest database sampled for basic epidemiology of laryngeal diseases. Additional queries will elucidate the utilization of resources and association of laryngeal disease with operations affecting laryngeal function.
OUTCOMES AFTER CRICOTRACHEAL SLEEVE RESECTION FOR IDIOPATHIC SUGLOTTIC STENOSIS

Authors: Patrick Carpenter; Marshall Smith

Institution: University of Utah

Presenter: Patrick Carpenter

Objective: Idiopathic subglottic stenosis (ISGS) is a chronic problem that is characterized by relapsing tracheal granulation tissue leading to severe dyspnea in a select patient population. The classic definitive management of these patients is surgical excision of the granulation tissue via cricotracheal sleeve resection (CTR). However, some patients develop recurrence despite undergoing resection. The objective of this study was to assess a population of individuals who have undergone CTR for ISGS and to analyze the outcomes including the incidence of recurrence in relation to patient co-morbidities.

Method: A review of patients with idiopathic sub-glottic stenosis and have undergone cricotracheal sleeve resection between the years 2000-2012. Diagnosis of idiopathic sub-glottic stenosis was made based of history and flexible laryngoscopy/bronchoscopy exams. Patients included in the study were followed post operatively for a minimum of 2 years.

Results: Fifty-five patients were included in the study. The patients had symptomatic dyspnea for an average of three years and underwent an average of 5 balloon dilations prior to CTR. Nine (16.3%) developed granulation tissue within the first month that resolved after excision and dilation. Six patients (10.9%) developed significant restenosis requiring operative intervention. The mean time to symptomatic restenosis was sixty-three months. The over-all cure rate for our population was 90%. No co-morbidities were statistically significant to predict odds for recurrent stenosis.

Conclusion: A significant proportion of individuals with idiopathic subglottic stenosis develop recurrence of stenosis despite CTR.
THE INCIDENCE AND DURATION OF SWALLOW-RELATED SYMPTOMS FOLLOWING SURGERY FOR OBSTRUCTIVE SLEEP APNEA

Authors: Masanari G Kato; Mitchell J Isaac; Marion B Gillespie; Ashli K O'Rourke

Institution: Medical University of South Carolina

Presenter: Masanari Kato

Objective: To determine the incidence and duration of swallowing-related symptoms following procedures to treat sleep apnea.

Method: Adult patients (≥18 years) who underwent surgical procedures for obstructive sleep apnea at a tertiary care institution by a single surgeon between September 2012 and December 2015 were retrospectively reviewed. Newly developed post-operative swallowing symptoms were evaluated for incidence, association to particular procedures, and duration to resolution.

Results: A total of 131 patients (138 operative encounters) met criteria for inclusion. There were 90 (68.7%) males and 41 (31.3%) females with an average age of 57 (range: 19-79). An average of 2.1 (±1.1) procedures were conducted at each encounter with palatopharyngoplasty (51.1%) being the most common followed by nasal turbinate mucosa cauterization (30.0%), radiofrequency ablation (23.2%), and hyoid suspension (20.3%). Post-operatively, 26 (18.7%) patients complained of dysphagia, 13 (9.4%) of globus, and 10 (7.2%) of odynophagia. Among patients with dysphagia, 8 (5.8%) were symptomatic beyond 6 months and 1 (0.7%) beyond 12 months. Globus persisted in 7 (5.0%) patients at 6 months and 2 (1.4%) at 12 months. Dysphagia patients most commonly had undergone palatopharyngoplasty (65.4%) or hyoid suspension (42.3%) while globus most frequently presented following radiofrequency ablation (53.8%) or palatopharyngoplasty (46.2%).

Conclusion: Post-procedure swallowing symptoms are relatively common following sleep apnea surgery although most symptoms appear to resolve within 12 months. Palatopharyngoplasty seems to be more frequently associated with these symptoms and may warrant pre-operative counseling and supportive measures in the post-operative period.
COMPARISON OF PATIENTS UNDERGOING ARYTIENOIDECTOMY WITH AND WITHOUT TRACHEOSTOMY FOR BILATERAL VOCAL FOLD IMMOBILITY

Authors: Yin Yiu; Michael Li; Brad deSilva; Laura Mattrka

Institution: The Ohio State University

Presenter: Yin Yiu

Objective: To identify factors that predict safe airway management in patients who undergo arytenoidectomy for treatment of bilateral vocal fold immobility (BVFI) without requiring tracheostomy placement.

Method: We present our experience of patients with BVFI who were managed with endoscopic arytenoidectomy and review the literature describing contemporary management of BVFI.

Results: Of 25 patients who underwent arytenoidectomy for BVFI, five were managed without tracheostomy. Four of these patients denied dyspnea at rest and lacked significant cardiopulmonary comorbidities. All five patients demonstrated glottic patency extending to the anterior commissure on laryngoscopy. Fourteen of the 20 patients who underwent tracheostomy did so at an outside facility prior to referral to our institution. Of the remaining patients, four underwent tracheostomy concomitantly with arytenoidectomy for anticipated airway instability given dyspnea with phonation or minimal exertion, and two patients had a tracheostomy placed urgently for respiratory distress.

Conclusion: The advent of endoscopic techniques to address BVFI was initially contingent on utilizing a tracheostomy preoperatively to secure the airway. However, current trends are leaning toward avoiding tracheostomy altogether. Regardless, the risk of airway compromise remains high during treatment of BVFI, and morbidity can be devastating. No studies exist that specifically focus on determining why certain patients tolerate a clinical course without tracheostomy and others do not. Our series suggests that functional status and glottic patency may be associated, though these variables must be better quantified and studied. Furthermore, earlier access to an airway specialist during dyspnea work-up may prevent unnecessary tracheostomy placement in select patients.
FEASIBILITY OF SCREENING WITH A NEW COUGH TEST DEVICE FOR EVALUATING THE RISK OF ASPIRATION PNEUMONIA

Authors: Kazunori Fujiwara

Institution: Tottori University

Presenter: Kazunori Fujiwara

Objective: The reflex cough test has been reported to be useful for the detection of silent aspiration, which is a known risk factor for aspiration pneumonia. However, no device is currently available for directly measuring the power of reflex cough. Therefore, we developed a new testing device that can measure this power with ease and verified whether screening with this device is feasible for evaluating the risk of aspiration pneumonia.

Method: The device comprises a special pipe, a nebulizer, and an electronic spirometer. L-tartaric acid is inhaled to initiate the reflex cough. The peak cough flow (PCF) of induced cough and time until cough reflex (TUCR) are measured with the spirometer. A videofluorographic swallowing study (VFSS) was also conducted to evaluate the swallowing function. The 117 patients who participated in this study comprised 75 patients without a history of pneumonia (group A) and 42 patients with a history of pneumonia (group B).

Results: PCF in group B (1.6L/min) was significantly lower than that in group A (2.5L/min) (p < 0.0002), and TUCR in group B (7.5 sec) was significantly longer than that in group A (4.2 sec) (p = 0.04). However, there was no significant difference between the PCF values of patients with and without aspiration based on VFSS.

Conclusion: Our device can simultaneously measure the TUCR and PCF of reflex cough with ease and is feasible for evaluating the risk of aspiration pneumonia. However, VFSS should be combined with the reflex cough test to precisely evaluate the swallowing function.
PROCESS AND PROPERTIES OF TRACHEAL WOUND HEALING IN A MURINE INJURY MODEL

Authors: Tohru Sogami; Ichiro Tateya; Masaru Yamashita; Atsushi Suehiro; Yo Kishimoto; Takuya Tsuji; Ryo Suzuki; Koichi Omori

Institution: Kyoto University

Presenter: Tohru Sogami

Objective: To assess process and histological properties of tracheal wound healing in a new murine model after injury.

Materials and methods: Twenty-seven ICR mice (12 weeks old) underwent tracheotomy with a vertical incision on the second to fifth tracheal cartilage rings followed by skin sutures. They were sacrificed humanely and their tracheae were harvested on 1, 3, 5, 7, 14, 21, 28 and 56 days after the operation. Each group contained three mice, with control mice without injury. The tracheae were subjected to histopathological examination including hematoxylin-eosin stain.

Results: Ninety-six percent of operated animals survived over 24 hours. The wounded area was controlled within small variance. The series of injured tracheae showed the following healing process. At acute phase (from the day one to five), primary wound closure with inflammatory cells was observed. After seven days, granulation was gradually replaced with collagen rich tissue, and concurrently reepithelization occurred from both surgical stumps. The regenerated cilia were hardly seen on restored epithelium.

Conclusion: In this study, we confirmed the tracheal wound healing process of mouse after injury. Epithelization was successfully completed, but functional recovery such as mucociliary transport remains to be investigated. Since our data showed low technical variance and low mortality, this animal model is suggested to be feasible for the wound healing research in tracheal tissue. Gene-manipulated mice can be utilized for further experiments in this field.
A055

SERIAL INTRALESIONAL STEROID INJECTIONS FOR SUBGLOTTIC STENOSIS

Authors: Caitlin Bertelsen; Hagit Shoffel-Havakuk; Karla O'Dell; Lindsay Reder

Institution: University of Southern California

Presenter: Caitlin Bertelsen

Objective: Standard treatment for subglottic stenosis (SGS) involves endoscopic dilation under general anesthesia. The main drawback of management is tendency for restenosis requiring repeat surgery. This study examines the efficacy of serial intralesional steroid injections (ISI) for SGS.

Method: Retrospective review of records of SGS patients who underwent at least two consecutive ISI during a 3 year period, performed under local anesthesia in the office. Historical data was available for many patients and was used in the analysis. Outcome measures included: surgery-free interval (SFI), number of procedures, decannulation rate, and adverse events.

Results: We identified 23 eligible patients. Twenty patients (87%) underwent dilation prior to ISI, three (13%) did not. Nine had idiopathic, eight had traumatic, and six had rheumatologic-related SGS. Mean follow-up time was 24.9 (±34.1) months. Of the 20 patients who had surgery, 17 have known surgical history; mean number of dilations prior to ISI in these patients was 2.47 (± 2.32). Seventeen patients (74%) did not require surgery after the ISI series (6/9 idiopathic, 6/8 traumatic and 5/6 rheumatologic). Mean dilations after ISI was 0.74 (±2.30). Mean SFI was 13.0 (±13.0) months overall and was 21.9 (±17.5), 13.4 (±13.35) and, 5.75 (±5.1) months for the rheumatologic, idiopathic, and traumatic subgroups respectively. All patients with a tracheotomy were in the traumatic subgroup; the decannulation rate was 40%. There were no adverse events associated with ISI.

Conclusion: ISI is an effective conservative management for SGS patients, allowing for prolonged SFI and avoiding repeat surgery in some patients.
COMPARISON OF PATIENT CHARACTERISTICS AND OUTCOMES IN INFECTIOUS AND NON-INFECTIOUS EPIGLOTTITIS

Authors: David S. H. Kim; Matthew Ng

Institution: University of Nevada

Presenter: David Kim

Objective: To compare patient characteristics and outcomes between patients with infectious and non-infectious epiglottitis.

Method: This was a retrospective review of 32 patients diagnosed with epiglottitis at a tertiary academic center between February 2014 and October 2016. All patients underwent flexible fiberoptic nasolaryngoscopy for diagnosis. Vital signs, laboratory tests, interventions and hospital courses were documented for all patients.

Results: There were 18 males and 14 females. The mean age was 45.6 ± 15.8 years. 26 patients were diagnosed with infectious epiglottitis. 6 patients had non-infectious etiologies: thermal injury from drug inhalation (n=3), pesticide inhalation (n=1), laryngeal trauma from a fall (n=1) and chemical injury from intractable emesis (n=1). The mean WBC was similar between infectious and non-infectious groups (13.4 ± 5.45 vs 15.1 ± 5.73 x10^3 cells/μL; p=0.258). 5 patients (15.6%) required emergent intubation while a tracheotomy was performed in 1 patient (3.1%). All 6 patients requiring emergent airway management were in the infectious group. The mean duration of intubation was 2.4 ± 1.1 days. All patients received at least 24 hours of intravenous antibiotics and steroids. The mean length of hospital stay among all patients was 2.8 ± 2.2 days (range: 1-8 days). The non-infectious group had a significantly shorter hospital stay than the infectious group (1.3 ± 0.52 vs 3.2 ± 2.3 days; p=0.033).

Conclusion: Both infectious and non-infectious epiglottitis have similar laboratory findings. Patients with non-infectious epiglottitis are less likely to require emergent airway management and have a much shorter hospital stay than those with infectious etiologies.
IS TRACHEOSTOMY ON THE DECLINE IN OTOLARYNGOLOGY? A SINGLE INSTITUTIONAL ANALYSIS

Authors: Andrew J Bowen; Michael S Benninger; Eric D Lamarre; Paul C Bryson

Institution: Cleveland Clinic

Presenter: Andrew Bowen

Objective: Tracheostomies are currently performed via open or percutaneous techniques. There is concern that the utilization of the percutaneous method is causing a gradual decline in the performance of this procedure by otolaryngologists. We analyzed trends in tracheostomies over a five year period to determine whether evidence exists of a decline.

Method: A retrospective review on tracheostomy procedures performed from 2010-2015 at one tertiary care center was conducted. Performing specialty, surgical technique, and bedside or operating room location were recorded. Procedures were separated by year and specialty to generate incidence rate ratios for otolaryngologists and non-otolaryngologists. Significance through negative binomial regression was completed across specialties.

Results: On average, 689 tracheostomies were performed yearly for a total of 4137 procedures over five years. Although otolaryngology was responsible for nearly 50% of all procedures in 2010, this number decreased to 38% by 2015, where cardiothoracic surgery performed the majority of procedures (40%). General surgery had the greatest increase in procedures rates from 13% to 25% from 2010-2014, which subsequently declined to 19% in 2015. General surgery was responsible for performing the majority of percutaneous bedside tracheostomies.

Conclusion: Otolaryngology performed less tracheostomies over the five year period. This decline was not as pronounced as observed in other studies. Our trend may be due to intra-institutional factors such as changes in resident teaching, consultation patterns, limited OR time, and the increasing utilization of percutaneous techniques by non-otolaryngologists.
RISK FACTORS FOR THYROID-SURGERY-RELATED UNILATERAL VOCAL FOLD PARALYSIS

Authors: Hung-Chun Chen; Tuan-Jen Fang; Yu-Chen Pei

Institution: Chang Gung Memorial Hospital

Presenter: Hung Chun Chen

Objective: To identify the risk factors of unilateral vocal fold paralysis (UVFP) after thyroid surgery and stratify preoperative patient status so as to justify the subgroup of patients that are especially in need of new nerve monitoring technologies.

Study design: Retrospective study.

Method: From April 2011 to February 2016, patients with UVFP caused by thyroid-related surgeries in a tertiary referral medical center in Taiwan were reviewed. UVFP was diagnosed through laryngoscopy and laryngeal electromyography (LEMG). Factors including patient demographics, surgery types, and the entity of thyroid lesions were evaluated. Results: Sixty out of 2637 patients received thyroid surgery (2.3%) were complicated with UVFP. The incidence of UVFP differed among surgery types (p<0.001) with the highest caused by total thyroidectomy with neck dissection (10.0%). The incidence of UVFP was comparable among age, gender, comorbidity and tumor status. Twenty out of the UVFP patients (33%) also had neuropathy in the external branch of superior laryngeal nerve (eSLN), among whom total thyroidectomy and neck dissection had the highest incidence (3.9%) (p<0.001).

Conclusion: The total thyroidectomy with neck dissection has the highest risk for UVFP and also for eSLN injury. Therefore, intraoperative nerve monitoring and novel surgery technologies are especially needed for patients receiving total thyroidectomy with neck dissection. Key Words: Thyroid surgery, unilateral vocal fold paralysis, external branch of superior laryngeal nerve, intraoperative nerve monitoring. Level of Evidence: 4.
DOES VOICE THERAPY IMPROVE VOCAL OUTCOMES IN VOCAL FOLD ATROPHY?

Authors: Emma Bick; Lukas Dumberger; Douglas Farquhar; Elizabeth Ramsey; Robert A Buckmire; Rupali N Shah

Institution: University of North Carolina

Presenter: Emma Bick

Objective: Vocal fold atrophy is increasingly identified in the geriatric population. Current literature shows varying outcomes with voice therapy. Our goal was to analyze multidimensional vocal outcomes of these patients who underwent voice therapy. Secondary aims included determining compliance and analyzing differences in patients who undergo surgery.

Method: 197 patients with vocal fold atrophy were included and reviewed. Patients were categorized by treatment received. Aerodynamic, acoustic, perceptual, and patient-reported vocal outcomes were recorded before and after therapeutic intervention. Changes were calculated and significance determined using paired t-test.

Results: 89(45%) received no therapy, 43(22%) incomplete therapy, 51(26%) complete therapy, 8(4%) surgery only, and 6(3%) therapy followed by surgery. Those who completed voice therapy showed significant improvement in voice related quality of life (VRQOL)(p=0.0297), glottal function index (GFI)(p<0.001), grade, roughness, breathiness, asthenia, strain (GRBAS)(p<0.001), maximum phonation time (MPT)(p=0.012), and fundamental frequency in women(p<0.001). No significant changes were found in mean airflow. When comparing patients who underwent surgery versus voice therapy, statistically significant differences were present between pre-treatment VRQOL (p=0.004) and GFI (p=0.0028).

Conclusion: Only 26% of patients with vocal atrophy completed voice therapy. Within this patient cohort, voice therapy results in significant improvement in multidimensional vocal outcomes. Vocal atrophy patients that have surgery versus therapy alone differ in pre-treatment patient-reported voice measures.
NOVEL USE OF THORACIC T-TUBE IN CONTROL OF FISTULA AND DELAYED REPAIR OF ESOPHAGEAL TRANSECTION WITH SUPRACLAVICULAR FLAP

Authors: Avram Hecht\textsuperscript{1}; David Lott\textsuperscript{2}; Thomas Savides\textsuperscript{1}; Richard Hayden\textsuperscript{1}; Philip Weissbrod\textsuperscript{1}

Institution: \textsuperscript{1}University of California – Davis; \textsuperscript{2}Mayo Clinic

Presenter: Avram Hecht

Objective: Describe the novel use of a thoracic T-tube for stenting of a total cervical esophageal transection prior to delayed supraclavicular flap reconstruction.

Methods: The patient is a 41 year old female who suffered a total esophageal transection during anterior spinal fusion at an outside institution. There was a 2-3cm circumferential esophageal defect within a severely inflamed surgical bed at the time of exploration. Primary esophageal reconstruction was not possible. Alternatively, a thoracic T-tube was placed into the defect trans-orally with the T-limb projecting through right neck wound. The T-tube was left in place to allow for granulation and control of fistula. Five months after placement, the T-tube was removed. The esophageal defect was noted to have mucosalized anteriorly and laterally, with partial endoluminal exposure of spinal hardware posteriorly. The hardware was removed and the defect reconstructed with a fasciocutaneous supraclavicular artery island flap.

Results: Placement of thoracic T-tube as a means for maintaining esophageal luminal continuity with a controlled fistula proved to be a successful technique. Within weeks of flap reconstruction, the patient tolerated oral intake and now is taking a normal diet.

Conclusion: In this case of total cervical esophageal transection, we were able to achieve a normal swallow subsequent to fistula control with a T-tube and delayed reconstruction.
CORRELATION BETWEEN LARYNGOLOGICAL CLINICAL EVALUATION AND VIDEOFLUOROSCOPIC SWALLOW STUDY FINDINGS IN PATIENTS WITH COUGH

Authors: Gregory R Dion; Omar H Ahmed; Danielle Brates; Yixin Fang; Matina Balou; Milan R Amin

Institution: New York University

Presenter: Gregory Dion

Objective: Videofluoroscopic swallow studies (VFSS) are commonly requested by otolaryngologists to evaluate swallow function in patients with cough, but no data exists on the utility of VFSS in this population. We aim to determine which history, clinical exam, and laryngoscopy findings correlate with abnormal VFSS findings in patients with cough.

Method: In this retrospective chart review, records for patients with a chief complaint of cough seen in a tertiary care laryngology practice and referred to speech language pathology between January 1, 2013 and December 31, 2015 were examined. Demographics, history, physical exam, and swallow study results were collected. Ten items from flexible videostrobolaryngoscopy were recorded, including: motion abnormalities, pooling of secretions, pharyngeal asymmetry, and glottal insufficiency. VFSS findings recorded included penetration, aspiration, delayed initiation, and presence of residue after swallow. Nonparametric statistical analysis was performed to determine correlations between history and clinical exam observation and VFSS findings.

Results: A total of 405 patients with a chief complaint of cough were referred to speech language pathology. Of those, 107 had a VFSS and 93 had an esophagram. Forty-nine patients had a VFSS after referral and were included in the analysis. Age (p=0.35), glottal insufficiency (p=0.33), pooling of secretions (p=0.10), any videostrobolaryngoscopic abnormality (p=0.07), cardiopulmonary history (p=0.29), and other variables did not correlate VFSS abnormalities in patients with cough. Only gender (p=0.02) was a predictor of an abnormal VFSS (86% males and 57% females).

Conclusion: This study found that videostrobolaryngoscopy and exam were not predictive of VFSS abnormalities in patients with cough.
RARE LARYNGEAL MANIFESTATIONS OF RHEUMATIC DISEASES

Authors: Rachel Kaye

Institution: New York Center for Voice and Swallowing Disorders

Presenter: Rachel Kaye

Objective: To report the presentations, treatments, and outcomes of unusual manifestations of autoimmune diseases affecting the larynx.

Method: A retrospective chart review from January 1 2007 to October 30, 2016 was performed on all patients who were identified as having atypical laryngeal findings of autoimmune disease at a clinical research center. Patient characteristics, treatments utilized, and subsequent outcomes were examined.

Results: Four patients were identified, two of whom were female. Patient 1 had known recurrent polychondritis (RP) and was found to have bamboo nodules on presentation that were treated with green-light laser. Patient 2 presented with subglottic edema and vocal fold hypomobility and later diagnosed with RP. His dysphonia and stridor resolved with systemic treatment. Patient 3 was diagnosed with Granulomatosis with Polyangiitis (GPA) after presenting with posterior commissure scarring causing bilateral cricoarytenoid fixation. He underwent a posterior cordotomy and medial arytenoidectomy and subsequent rheumatologic evaluation. Patient 4 had rheumatoid arthritis (RA) and developed an obstructing rheumatoid nodule of the arytenoid which recurred after laser excision, necessitating tracheotomy. She is attempting decannulation following improved systemic disease control.

Conclusion: We present four cases of unusual laryngeal manifestations of autoimmune diseases which have been rarely reported in the literature. All manifestations have had less than 30 prior reported cases with only one prior case for both bamboo nodules in RP and for an obstructive rheumatoid nodule in RA. These unusual manifestations of autoimmune diseases are important to recognize as the correct diagnosis and treatment can significantly impact the outcome following intervention.
EFFICACY OF SUBLESIONAL AVASTIN (BEVACIZUMAB) ON RECURRENT LARYNGEAL PAPILLOMA

Authors: Mrudula Thiriveedi; David Lott

Institution: Mayo Clinic

Presenter: Mrudula Thiriveedi

Objectives: This study aimed to illustrate the efficacy of sublesional Avastin (bevacizumab) on recurrent laryngeal papilloma.

Methods: A retrospective chart review was performed for both males and females aged 18 to 95 years. All participants included in this study were diagnosed with recurrent laryngeal papilloma and treated with KTP laser photoablation and sublesional bevacizumab subsequent to July 2011 at a single academic institution. Data were tabulated for demographic information (age, sex), number of vocal fold segments affected (VFSA) and time interval between procedures, factors affecting the use of bevacizumab, and complications.

Results: Nineteen patients were included. All patients had a decrease in the number of VFSA after the use of bevacizumab compared to when bevacizumab was not used. Bevacizumab injected sublesionally following KTP laser photoablation was found to significantly decrease tumor burden at subsequent visits by 6.15 vocal fold segments. No increase in time interval between procedures following injection of bevacizumab was noted in the study. The number of VFSA at the time of decision was the single most important factor affecting the decision to use bevacizumab. There were no complications noted in this study even after multiple doses of bevacizumab.

Conclusions: Findings of this study have provided evidence that the pharmacologic antiangiogenic agent bevacizumab appears to be safe and efficacious in the treatment of recurrent laryngeal papilloma and enhances photoablative KTP laser treatment.
REINKE'S POLYP REDUCTION FOLLOWING TREATMENT WITH KTP LASER VERSUS MICROFLAP EXCISION SURGERY

Authors: Lukas D. Dumberger; Douglas Farquhar; Rupali N. Shah; Robert A. Buckmire

Institution: University of North Carolina

Presenter: Lukas Dumberger

Objectives: We compared the temporal and quantitative outcomes of patients undergoing KTP laser versus microflap, excisional surgery for treatment of Reinke’s edema (RE).

Methods: Twenty patients with a primary diagnosis of RE, treated with either microflap surgery or KTP laser treatment, and with sufficient videostroboscopic data for image analysis were retrospectively reviewed. Preoperative and postoperative still images from multiple postoperative time points: T1 (0-4wks), T2 (1-3 months), T3 (4-6 months), and T4 (6mo-1year) were analyzed using Image J 1.49v (National Institutes of Health, USA). T-Tests were used to compare change in preoperative to postoperative vocal fold size following intervention.

Results: When comparing treatment groups (KTP and microflap), no significant difference between preoperative vocal fold size was found (p=0.51). Taken together, all patients experienced a significant reduction in average vocal fold size from preoperative to postoperative (0-3 months) (p= 0.0006). Microflap treated vocal folds demonstrated significant size reduction at time points T1, T2, and T3, while KTP treated folds demonstrated statistically significant size reduction at time points T2 and T3, but not T1. Comparison of vocal fold size reduction between KTP and microflap treated vocal folds demonstrated no statistical difference at any time point.

Conclusion: KTP laser photoablation and photocoagulation is a less invasive treatment for the primary diagnosis of RE. Our data show comparable vocal fold size reduction between KTP and more traditional excisional techniques. In accordance with clinical observation, KTP treatment offers a delayed maximal volume reduction occurring in the range of 1 to 3 months posttreatment.
TRANILAST ATTENUATE THE GRANULATION AND RE-STENOSIS AFTER 3-D PRINTED TRACHEAL SCAFFOLD IMPLANTATION

Authors: Seong Keun Kwon; Young Bin Choi; Su A Park

Institution: Seoul National University Hospital

Presenter: Seong Keun Kwon

Objective: Tracheal restenosis has been the main obstacle to successful tracheal replacement, and remains to be the greatest challenge in tracheal regeneration. Tranilast has been known to prevent granulation tissue proliferation by inhibiting the secretion of TGF-β which is a key regulator of granulation formation and fibrosis. In this study, we aimed to incorporate the Tranilast (N-[3, 4- dimethoxycinnamoyl]-anthranilic acid) to the tracheal scaffold and the thread and analyze the serial change after implantation.

Method: Asymmetrically porous scaffolds, which successfully prevented tracheal stenosis in partial trachea defect model, were designed in tubular shape by 3D-printing and transplanted to the 2 cm long circumferential defect of rabbit trachea. Scaffold and thread were coated with or without Tranilast. Experimental groups were divided into four group according to the Tranilast coating. Coating with Tranilast on scaffold/thread; Group I (-/-): Group II (+/-): Group III (-/+): Group IV (+/+). Serial rigid bronchoscopy, microCT, and histology (H&E, Masson's trichrome, IHC staining against M1(IL1-b&iNOS) and M2(CD163&TGF-b) markers were performed.

Results: On bronchoscopic exam, Gr I, II and III showed severe luminal stenosis while group IV, showed no stenosis and granulation. Moreover, partial epithelial lining on the luminal surface of graft was observed in group IV. MT staining showed decreased collagen deposit in Gr IV. On IHC staining, decreased expression of the macrophage markers in Gr IV was identified.

Conclusion: Tranilast coating on tracheal scaffold and thread was effective for preventing the tracheal re-stenosis after scaffold transplantation and can potentially be employed as tracheal tissue engineering.
A NOVEL AURICULAR HEMATOMA TRAINING MODEL

Authors: Tammy Wang

Institution: University Hospitals Cleveland Medical Center

Presenter: Nicole Maronian

Objective: To describe a realistic, easily reproducible training model for auricular hematoma incision, drainage, and bolster placement.

Method: A training model for auricular hematoma was developed using pig ears and strawberry jelly. This model was implemented at an otolaryngology training session for junior residents.

Results: Participants were provided with an auricular hematoma training model on which they performed incision, drainage, and bolster placement. Participants described the training model as realistic and helpful in improving technical proficiency in bedside auricular hematoma management.

Conclusion: We describe an easily reproducible auricular hematoma training model that provides an effective and realistic opportunity for junior otolaryngology residents in training.
Authors: Mi Jin Yoo; Allen Hillel

Institution: University of Washington

Presenter: Mi Jin Yoo

Objective: Complications from head and neck radiotherapy may include neuromuscular fibrosis with painful dystonic spasms. We describe botulinum toxin (BTX) injection for radiation-induced head and neck dystonic spasm and pain.

Method: Retrospective chart review from March 2010 to November 2016 was performed at a tertiary care center on patients who received radiation for head and neck malignancy with subsequent development of painful spasms that were treated with BTX injections.

Results: Six patients were identified (five male, one female) with the average age of 48.7 years (range 34-65). The average onset of dystonic spasms was 51 months (range 2 months-17 years) following radiation. Two patients had parotid mucoepidermoid carcinoma, two patients had base of tongue squamous cell carcinoma (SCC), one had buccal SCC, and one had unknown primary SCC. The average radiation dose was 65 Gray for external beam (n=4) and 18.6 Gray for neutron (n=2) therapy. Wide range of muscle groups including masseter, sternocleidomastoid, levator scapulae, trapezius, scalene, splenius capitis, digastric, and tongue musculature were targeted with electromyography-guided BTX injections. The BTX dose varied widely (12.5-100 Units). Average follow up was 33 months (range 4 months-6 years). Five patients had complete relief and one patient had 50% relief of dystonic spasm and pain.

Conclusion: Radiation-induced toxicity in the head and neck may produce painful dystonic spasms. This study expands upon the diverse non-cosmetic application of BTX injections by describing BTX injection for a wide range of head and neck muscle groups affected by radiation-induced dystonic spasm and pain.
DOES THE PENETRATION-ASPIRATION SCALE PREDICT FUTURE RESPIRATORY ILLNESS IN INFANTS?

Authors: Geoffrey Casazza; Marshall Smith; Leann Smith; Harlan Muntz; Jeremy Meier

Institution: University of Utah; Primary Children’s Hospital

Presenter: Geoffrey Casazza

Objective: Evaluate if the Penetration-Aspiration Scale (PAS) predicts future respiratory illnesses.

Method: A retrospective case series of 150 infants under one-year evaluated with a modified barium swallow study (MBSS) at a tertiary children’s hospital was performed. Patients born <34 weeks, those with comorbid cardiac, neurologic, genetic, or craniofacial diagnoses, with <6 months follow-up or incomplete data were excluded. Patients were divided into two groups based on the highest PAS for thin liquids, Group A (PAS 1-4) and Group B (PAS 5-8). Groups were compared on number of Emergency Room/Urgent Care [ED], Inpatient [INPT], and Pediatric Intensive Care [PICU] admissions.

Results: There were 99 patients in Group A and 51 in Group B. Mean age of first MBSS was 18.8 weeks (0.6 to 49.1) and average follow-up was 18.6 months (6 to 35). 23 patients had a nasogastric tube placed after failed MBSS. 60 patients underwent at least 1 repeat MBSS, in 29 (19.3%) 2, in 18 (12%) 3, and in 14 (9.3%) 4 or more. A type I laryngeal cleft was identified in 6 patients (4%). 114 patients (76%) were recommended a regular diet at study conclusion. The number of ED visits for Group A and B were 1.21 v 0.90 (p = 0.07), INPT 0.59 v 0.78 (p = 0.60), and PICU 0.08 v 0.27 (p = 0.36) respectively.

Conclusion: The PAS score was not predictive of future admissions. Future studies are needed to prospectively evaluate impacts of PAS score and clinical interventions on outcomes for infants with dysphagia.
A DIAGNOSTIC DILEMMA: PLASTIC BRONCHITIS PRESENTING AS COMPLETE HEMITHORAX OPACTION IN A MINIMALLY SYMPTOMATIC PATIENT

Authors: Anju Patel; Celeste Nagy; Stephanie Ambrose; Kara Prickett

Institution: Emory University

Presenter: Anju Patel

Objective: We describe a unique case of unilateral plastic bronchitis presenting as complete left lung opacification in a minimally symptomatic pediatric patient.

Method: Case report

Results: A 10 year-old male presented with mild chest pain and dry cough during football practice, without dyspnea, increased work of breathing, or infectious symptoms. A chest radiograph revealed complete opacification of the hemithorax with left main bronchus cut off sign. CT chest revealed low-density material obstructing the lumen approximately 1.5 cm before the origin of the left upper lobe bronchus. The right lung was normal in appearance. Differential diagnosis included bronchoaspiration, mucus plugging, or endobronchial mass. Rigid and flexible bronchoscopy were performed, revealing impacted tan material in the left main, segmental, and subsegmental bronchi that appeared to represent aspirated food material. Bronchoalveolar lavage showed light growth of Pseudomonas aeruginosa. Post-operative radiograph showed re-expansion of the left lung. He was treated with albuterol, 3% hypertonic saline, chest physical therapy, oral prednisolone, and levofloxacin. Complementary testing including sweat chloride testing; fecal fat, fatty acids, and elastase; and oral-pharyngeal motility study were normal. Pathologic analysis showed fibrinous casts with neutrophils and abundant eosinophils, as seen in type 1 plastic bronchitis.

Conclusion: This is a unique presentation of unilateral plastic bronchitis in an otherwise healthy child. The subacute presentation, unilateral imaging findings, and lack of predisposing conditions are unusual for a condition that typically presents in critically ill patients with symptomatic airway obstruction. Plastic bronchitis should be considered in the differential diagnosis of endoluminal airway obstruction.
FRESH BLUNT LARYNGEAL TRAUMA: CLASSIFICATION AND MANAGEMENT OF 52 CASES IN JAPAN

Authors: Hirohito Umeno

Institution: Kurume University School of Medicine

Presenter: Hirohito Umeno

Objective: To evaluate a management of blunt laryngeal trauma in Japan and to make an new classification due to the present of Japanese situation.

Method: Fifty-two fresh blunt laryngeal trauma patients were treated in our hospital during from 1971 to 2015. Disease status was investigated presence of endolaryngeal edema or hematoma 1), vocal cord mobility disturbance 2), detectable fracture displacement or exposure of cartilage should receive exposure surgery 3), mucosal disruption to be restored should receive reposition surgery of cartilage and restoration of mucosa 4).

Results: There were 26 patients with 1), 5 with 1)2), 9 with 1)3), 2 with 1)2)3), 6 with 1)3)4), 4 with 1)2)3)4). Four of 5 patients recovered vocal cord mobility with 2). Another one patient was lost to follow-up. All of two patients with 1)2)3) recovered mobility. Three of 4 patients with 1)2)3)4) recovered mobility. Another one patient had an arytenoid dislocation.

Conclusion: Japanese blunt laryngeal trauma should be classify by new criteria against laryngeal trauma was classified previously by Trone. Group1 included those patients with endolaryngeal edema or hematoma should receive conservative therapy. Group2 consisted of Group1 and vocal cord mobility disturbance should receive conservative therapy. Group3 indicated Group1 and detectable fracture displacement or exposure of cartilage should receive exposure surgery. Group4 consisted of Group3 and mucosal disruption to be restored should receive reposition surgery. It may not be present of cord mobility disturbance with Group 3 and 4.
RECRUITMENT TO HIGH RISK AIRWAY CLINICAL TRIALS: PROTOCOL DEVELOPMENT

Authors: Martin A Birchall; Dominic Bowers; Mark Lowdell

Institution: University College London

Presenter: Martin Birchall

Objective: Advanced therapeutic medicinal products (ATMP) are now being introduced to airway surgery. Where delivering a novel cell, gene or tissue engineered product in vulnerable patients incurs significant potential risk, there is a need for a robust ethical patient recruitment protocol.

Method and results: Based on two trials of tissue engineered airway reconstruction, we developed an iterative recruitment process in which PPI (patient and public involvement) and independent external clinical review are critical.

Conclusion: To protect patients, optimize recruitment and address ethical concerns, our protocols may form templates for the safe conduct of trials for new, but potentially high risk, airway technologies.
PSEUDOSARCOMATOUS MYOFIBROBLASTIC PROLIFERATION (INFLAMMATORY PSEUDOTUMOR) OF THE HYPOPHARYNX: A CASE REPORT AND LITERATURE REVIEW

Authors: Tom C Zhou; Brad W deSilva

Institution: Ohio State University

Presenter: Tom Zhou

Objective: To present a case of pseudosarcomatous myofibroblastic proliferation, or inflammatory pseudotumor (IPT), of the hypopharynx along with a literature review of presentation, diagnosis, and management of IPT.

Method: A case of IPT in the hypopharynx is reported from a tertiary referral center and a retrospective review of cases of IPT in the head and neck is discussed.

Results: IPT is a benign pseudoneoplastic proliferation related to idiopathic inflammation that has been found to occur in various sites but is exceedingly rare in the head and neck. We report a case of hypopharyngeal IPT in a 36-year-old male presenting with dysphagia and orthopnea. Computerized tomography (CT) of the neck with contrast revealed a 4.1 cm lobulated mass from the hypopharynx extending to posterior oropharynx. Flexible fiberoptic laryngoscopy demonstrated a smooth and lobulated mass causing near complete obstruction of laryngeal inlet. The patient underwent awake fiberoptic intubation with surgical excision via direct microlaryngoscopy. Histopathologic analysis using immunostains confirmed diagnosis of Pseudosarcomatous Myofibroblastic Proliferation (Inflammatory Pseudotumor). Follow-up at 3 weeks revealed unremarkable post-operative course.

Conclusion: Only two cases of hypopharyngeal IPT have been previously reported in the literature. Presentation is related to mass effect and obstructive nature of the lesion. Workup should include flexible fiberoptic laryngoscopy and CT neck with contrast. Excision via direct microlaryngoscopy is an effective minimally-invasive surgical approach. IPT should be considered in patients with head and neck mass as inaccurate diagnosis of malignant lesion could potentially lead to improper management.
NR4A1 AS AN ENDOGENOUS INHIBITOR OF TRANSFORMING GROWTH FACTOR-BETA MEDIATED VOCAL FOLD FIBROSIS

Authors: Nao Hiwatashi; Renjie Bing; Iv Kraja; Ryan Branski

Institution: New York University

Presenter: Nao Hiwatashi

Objective: NR4A1 was recently shown to be an endogenous inhibitor of TGF-β-induced fibrosis and is likely key therapeutic target for fibrotic disease. Given the significant clinical implications for vocal fold (VF) fibrosis, we sought to investigate NR4A1 expression during vocal fold wound healing in vivo and to describe the regulatory roles of NR4A1 on vocal fold fibroblasts (VFFs) in vitro.

Method: In vivo, the temporal pattern of NR4A1 mRNA expression was quantified following rat VF injury. In vitro, the role of NR4A1 on transcription level events related to fibrosis as well as collagen gel contraction and fibroblast-myofibroblast differentiation in response to exogenous TGF-β1 stimulation was quantified in a human VFF cell line. Small interfering RNA (siRNA) was also employed to silence NR4A1 to further elucidate this complex feedback system.

Results: NR4A1 mRNA increased 1 day after injury and peaked at 7 days. Knockdown of NR4A1 resulted in upregulation of COL1A1 and TGF-β1 with TGF-β1 stimulation (both p<0.001). In addition, NR4A1 knockdown resulted in increased contraction (p=0.007) and alpha smooth muscle actin (αSMA)-positive cells in response to TGF-β.

Conclusion: To date, NR4A1 has not been described in vocal fold health or disease. Upregulation of TGF-β following vocal fold injury is accompanied by concurrently increased NR4A1 expression which is thought provide negative feedback. These data provide a foundation for the development of novel therapeutic strategies given persistent activation of TGF-β signaling in vocal fold fibrosis.
ESOPHAGEAL DILATION FOLLOWING TOTAL LARYNGECTOMY: A DESCRIPTION OF RATES AND EFFECTIVENESS

Authors: Christopher M Shumrick; Michael C Topf; James Hamilton; Joseph M Curry; Adam J Luginbuhl; David M Cognetti; Maurits S Boon; Joseph R Spiegel

Institution: Thomas Jefferson University

Presenter: Christopher Shumrick

Objective: To describe the rates and effectiveness of esophageal dilation following total laryngectomy at a single institution.

Method: The records of forty-one consecutive patients who underwent esophageal dilation after total laryngectomy were reviewed for operative details, pre- and post-dilation diets, and percutaneous endoscopic gastrostomy (PEG) tube dependence. Improvement in diet was defined as an increase from a less dense diet to a denser diet.

Results: All patients underwent dilation with either Maloney or Savary dilators under general anesthesia. Nineteen patients (46%) were salvage total laryngectomy, seventeen (44%) primary total laryngectomy, and five (12%) underwent total laryngectomy for dysfunctional larynx. Eighteen patients (44%) reported improvement in diet. Of those who noted improvement, nine underwent a single dilation and nine underwent multiple dilations (two or more). There were no major complications of esophageal injury or perforation. The average number of dilations for patients receiving two or more was 4.8 with a range spanning from 2 to 12. Average time from total laryngectomy to first dilation was 271 days with a range spanning from 45 to 1178 days.

Conclusion: Esophageal dilation is a safe procedure that improves diet for some patients after total laryngectomy. Further study is needed to determine those most likely to benefit from undergoing dilation. To our knowledge, this is the first investigation of esophageal dilation following total laryngectomy.
DOES ADJUVANT THERAPY HAVE TO BE ADMINISTERED IN SERIES OF THREE INJECTIONS TO IMPROVE SURGERY INTERVALS IN PATIENTS WITH RECURRENT RESPIRATORY PAPILLOMATOSIS?

Authors: Rishabh Sethia; Brad W. deSilva; Lowell A. Forrest; Laura Matrka

Institution: The Ohio State University

Presenter: Rishabh Sethia

Objective: To review intervals between surgeries in recurrent respiratory papillomatosis (RRP) patients who were treated with adjuvant cidofovir or bevacizumab and to identify any differences between patients who received a pre-prescribed series of 3 serial adjuvant injections versus those who did not.

Method: Medical records were retrospectively reviewed for RRP patients treated at a tertiary referral center from 2008 to 2016. Patients who received at least one injection of cidofovir or bevacizumab were included. Demographic, clinicopathologic, and follow-up data were collected.

Results: Of 17 patients who received adjuvant injections, 10 (59%) received cidofovir, 2 (12%) received bevacizumab, and 5 (29%) received both. Before adjuvant treatment, patients received a mean of 2.1 procedures per year (PPY) with 151 days between. After adjuvant treatment, PPY decreased to 0.98 (p<0.01) with 181 days between (p=0.45). 5 received a standard series of 3 injections, and 12 received variations. Decreased PPY was seen in both groups following adjuvant therapy, and was statistically significant in the variation group, where PPY decreased from 1.8 to 1.0 (p=0.04). Decreased number of recurrences per year was also seen in both groups, and was statistically significant in the standard 3-injection series group (3.5 to 0.75 (p=0.047)). Mean follow-up was 4.6 years.

Conclusion: Cidofovir and bevacizumab decrease number of surgeries and recurrences in RRP patients. The standard schedule of 3 injections does not clearly yield better results. Larger cohort studies are necessary to fully evaluate these adjuvant treatments.
UNDERSTANDING PATIENT EXPECTATIONS REGARDING ELECTRONIC CIGARETTE COUNSELING FROM THEIR OTOLARYNGOLOGIST

Authors: Viran Ranasinghe; Natasha Mirza

Institution: University of Pennsylvania

Presenter: Viran Ranasinghe

Objective: 1) Measure the prevalence of electronic cigarette and vaporizer use among otolaryngology patients, 2) assess whether patients would use their otolaryngologist as a source of information regarding electronic cigarettes.

Method: An in-office survey was administered to a consecutive cohort of patients presenting to otolaryngology clinic at an academic medical center in October 2016. The survey assessed past and prior tobacco, electronic cigarette, and vaporizer use. Finally, patients were asked whether they would use their otolaryngologist as a resource for information regarding electronic cigarettes. Otolaryngology attendings were administered a Likert scale survey to assess their comfort level counseling patients regarding these devices.

Results: Fifty patients completed the survey. Twenty-seven (54%) of the survey respondents said that they would want questions about electronic cigarettes answered by their otolaryngologist. Four (8%) patients were current/previous electronic cigarette users and all electronic cigarette users had used electronic cigarettes as an alternative to tobacco products. Five attendings completed the survey with an average Liekert score of neither comfortable nor uncomfortable counseling patients, (mean=3.0 ± 1.4 (SD)).

Conclusion: Electronic cigarettes are classified as tobacco products and contain varying amounts of nicotine compared to traditional cigarettes. As electronic cigarette use becomes more prevalent, patients may look to their otolaryngologist for further information. Physician education within otolaryngology regarding electronic could prove valuable for patient counseling.
PILOT TESTING OF A LARYNGEAL SUTURE SIMULATOR: FEASIBILITY AND CONSTRUCT VALIDITY

Authors: Rachel Kaye¹; Jeremy Torrisi²; Randall Bly³; Craig Miller⁴; Kaalan Johnson³; Michel Nassar²

Institutions: ¹New York Center for Voice and Swallowing Disorders, ²Montefiore Medical Center, ³Seattle Children’s Hospital, ⁴University of Washington

Presenter: Rachel Kaye

Objective: There is currently a lack of validated laryngeal suturing simulation curricula which is important due to the complexity and narrow margin of safety of phanosurgery and laryngeal cleft repair. We developed a low cost laryngeal suturing simulator and sought to test its feasibility and construct validity.

Method: An operating microscope and storage container suspending a laryngoscope was used to visualize a soft tissue suture pad affixed to a temporal bone holder. Subjects were otolaryngology trainees at a tertiary care center (n=24). Subjects utilized standard microlaryngeal instruments to perform 5 suture placement attempts. Video recordings of microscopic and hand movement views were obtained and performance was rated by two expert observers on a novel objective structured assessment of technical skills (OSATS) scale modified for use in laryngeal suturing. Averaged OSATS scores of “early” (trials 1&2) and “late” (trials 4&5) estimations were compared using two-tailed paired t-tests. Subjects also completed a self-assessment and acceptability questionnaire.

Results: Later trials had significantly reduced average completion times compared to early trials (182 vs 292 seconds, p<0.01), and overall average OSATS scores significantly improved between early and late trials (2.71 vs 3.72 on a 5-point Likert scale, p<0.01). Reviews of the simulator by subjects were positive (>3 on a 5-point Likert scale).

Conclusion: We present a novel low-cost laryngeal suturing simulation model and OSATS tool that demonstrated feasibility and construct validity in improving trainee laryngeal suturing performance.
PREDICTING DYSPHAGIA AFTER CARDIAC SURGERY

Authors: Ashley Kita; Son Nguyen; Allen Zhu; William Toppen; Adeel Ashfaq; Jessica Davis; Richard Shemin; Peyman Benharash; Abie Mendelsohn

Institution: University of California – Los Angeles

Presenter: Ashley Kita

Objective: Dysphagia after cardiac surgery is known to occur in approximately 3 to 8% of patients. Dysphagia has been previously linked to increased surgical complications and extended hospital admissions. This study sought to create a new tool to help identify patients likely to experience postoperative dysphagia so that targeted measures may be employed sooner to reduce the incidence of these known associations.

Method: Patients who underwent non-emergent, non-transplant cardiac surgeries from January 2014 to July 2015 were examined for risk factors including gastrointestinal reflux, low ejection fraction, increased operation time, late intubation time, number of intubation attempts, and age over 75. Patients were then assigned a score from 0 to 6 based upon the presence of these risk factors. Patient scores were further stratified into low and high risk and examined for sensitivity and specificity at different cutoffs.

Results: Of the 406 patients (34% female) included for analysis, 50 (12%) were diagnosed with postoperative dysphagia. Patients scores of 2 or higher were found to identify individuals who experienced postoperative dysphagia with a sensitivity of 0.92 and specificity of 0.42. Probability of dysphagia increased with score. Of those individuals with a score of 6, 0.67% were found to have dysphagia postoperatively.

Conclusion: Dysphagia is an independent and important contributor to healthcare cost after cardiac operations. Efforts to identify and treat these patients more expediently may have far-reaching effects. Furthermore, the risk factors included in the score described here highlight some excellent perioperative targets for future quality improvement studies.
THE EFFECT OF VOCAL FOLD AUGMENTATION ON PATIENT PERCEPTION OF CHRONIC COUGH SYMPTOMS IN THE PRESENCE OF GLOTTIC INSUFFICIENCY

Authors: Juliana K Litts; Matthew S Clary

Institution: University of Colorado

Presenter: Juliana K Litts

Objective: To determine the effect of injection augmentation of the vocal folds on chronic cough symptoms in patients with glottic insufficiency.

Method: Medical records from 146 consecutive patients who underwent vocal fold augmentation by a fellowship-trained laryngologist between 2013 and 2015 were reviewed. 23 patients (11 female) met the inclusion criteria of a vocal fold augmentation injection, cough symptoms lasting more than 6 weeks, and glottic insufficiency as determined by shortened closed phase on stroboscopy. Exclusion criteria included diagnosis of vocal fold immobility, previous history of vocal fold augmentation, and incomplete data sets. Data collected included age, gender, pre- and 1 month post-injection Cough Severity Index (CSI) scores, location of injection (unilateral or bilateral), and patient statement of percent change in symptoms that was recorded at 1 month post-injection visit.

Results: Paired t-test indicated a significant decrease in CSI scores from pre- (m=18.5) to 1 month post- injection (m= 12.1) (p= 0.004). 18 patients (78.2%) reported a 50% or greater improvement in cough symptoms at the 1 month post- injection visit.

Conclusion: Injection augmentation of the vocal folds in the presence of glottic insufficiency appears to improve cough symptoms as reported by CSI in patients who are refractory to other medical and behavioral treatments.
IN-VIVO MEASUREMENT OF VOCAL FOLD EPITHELIAL SURFACE RESISTANCE

Authors: Masanobu Mizuta; Takashi Kurita; Neal P Dillon; Emily E Kimball; C. Gaelyn Garrett; Robert J Webster; Preeti Sivasankar; Bernard Rousseau

Institution: Vanderbilt University

Presenter: Takashi Kurita

Objective: We custom-designed a minimally invasive device to measure vocal fold epithelial surface resistance in vivo as a measure of functional epithelial barrier integrity in a rabbit model. The purpose of this study was to determine the feasibility of using vocal fold epithelial surface resistance as a proxy of functional epithelial barrier integrity after acute phonotrauma.

Method: New Zealand White breeder rabbits received 120 minutes of airflow without vocal fold approximation (control), or 120 minutes of experimentally-induced raised intensity phonation (experimental group). The probe was inserted via laryngoscope and placed on the left vocal fold under endoscopic visualization. Epithelial surface resistance of the middle 1/3 of the vocal fold was measured after 0 (baseline), 60, and 120 minutes of phonation. After the phonation procedure, the larynx was harvested and prepared for transmission electron microscopy.

Results: In the control group, epithelial surface resistance values remained stable across all time points. In the experimental group, resistance values were significantly reduced after 120 minutes of raised intensity phonation (X±Y% relative to baseline). These findings correlated with transmission electron microscopy findings, which revealed structural damage to the vocal fold epithelium after phonotrauma.

Conclusion: Measurement of vocal fold epithelial surface resistance provides a non-invasive means to evaluate functional vocal fold epithelial barrier integrity. Device prototypes are currently being developed for further validation and for eventual clinical applications.
ANALYSIS OF COLLAGEN PRODUCING CELLS IN INJURED VOCAL FOLDS

Authors: Yoshitaka Kawai¹; Yo Kishimoto¹; Tsuyoshi Morisaki²; Hideaki Okuyama¹; Tohru Sogami¹; Ryo Suzuki¹; Takuya Tsuji¹; Masanobu Mizuta¹; Ichiro Tateya¹; Koichi Omori¹

Institutions: ¹Kyoto University; ²Tottori University

Presenter: Yoshitaka Kawai

Objective: Collagen plays an important role in tissue repair, and several cell types are known to synthesize collagen in the vocal fold; fibroblast, myofibroblast, and fibrocyte. However, the contribution extent of these cells’ collagen production in wound healing is still unclear. This study focuses on revealing the transition of the component ratio in the type1 collagen(COL1) producing cells during the restoration course of vocal fold injury, using COL1-GFP transgenic mice in which COL1 producing cells are labeled with GFP.

Study Design: Prospective in vivo murine study Methods: Col1-GFP mice underwent surgery to injure vocal fold mucosa. Larynges were harvested at 1, 3, 7, and 14 days post-injury. Samples were Immunohistochromically analyzed.

Results: COL1 producing cells increased at day 7 and reverted at day 14. Except the increase of myofibroblasts at day 3, no significant difference was observed in the component ratio of the COL1 producing cell types.

Conclusion: In spite of the obvious increase in the COL1 producing cells during the restoration course, the component ratio of these cells showed small difference, except temporary myoblast increase.
Efficacy of Endoscopic Balloon Dilation in Glottic Stenosis and Bilateral Vocal Fold Immobility

Authors: Mrudula Thiriveedi; David Lott

Institution: Mayo Clinic

Presenter: Mrudula Thiriveedi

Objective: This study aimed to illustrate the efficacy of endoscopic balloon dilation in glottic stenosis and bilateral vocal fold immobility in terms of ability to live without a tracheostomy tube and quality of life measures.

Method: A retrospective chart review was performed for both males and females aged 18 to 95 years. All participants included in this study were diagnosed with glottic stenosis or bilateral vocal fold immobility and treated with balloon dilation since July 2011 at a single academic institution. Data were tabulated for demographic information (age, sex), quality of life measures, etiology of glottic stenosis (post-radiotherapy, post-intubation, autoimmune), size of the balloon, number and frequency of procedures, need for tracheostomy, decanulation if performed and complications.

Results: 26 out of 33 patients did not require tracheostomy or any other procedure to maintain the airway. This amounts to a success rate of 78.8%. However, there is no statistically significant difference in success rate among the three different groups based on etiology (p value=0.0622). Radiotherapy as the etiology of glottic stenosis was found more in males (77.8%) when compared to autoimmune and post-intubation etiologies (both 33.3%). However, this didn’t reach statistical significance (p value=0.0584). There were no complications noted in this study even after multiple balloon dilation procedures. Quality of life measures were in acceptable ranges.

Conclusion: Findings of this study have provided evidence that balloon dilation has a significant role in obviating the need for tracheostomy in patients with glottic stenosis or bilateral vocal fold immobility.
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TOLERANCE TO PHARMACOTHERAPY IN SENSORY NEUROPATHIC COUGH: A RETROSPECTIVE REVIEW

Authors: Andrew J Bowen, Tiffany L Huang, Michael S Benninger, Claudio F Milstein, Rachel M Taliercio, Paul C Bryson

Institution: Cleveland Clinic

Presenter: Andrew Bowen

Objective: Sensory Neuropathic Cough (SNC) is a perplexing condition treated with a combination of speech therapy and neuromodulators. Although previous literature describes the effectiveness of pharmacotherapy, there is little on the development of tolerance to neuromodulators over time. Our objective is to capture the experience of a large cohort of patients treated for SNC and any development of tolerance towards treatment.

Method: A retrospective review of all patients evaluated for chronic cough from 2011-2015. Patient demographics and subjective outcome measures were recorded for each patient.

Results: 90 patients (70% female) were diagnosed with SNC over the four year period. Approximately 50% of patients were initially prescribed amitriptyline, followed by gabapentin (20%), nortriptyline (20%), tramadol (2%), and desipramine (2%). Around a quarter of patients were lost to follow up prior to one year. Roughly half of the patients initially prescribed gabapentin stayed with their initial regimen. 60% of patients on amitriptyline required higher doses and ultimately switched to a different neuromodulator. Roughly 15% of those who developed tolerance to amitriptyline did so following an upper respiratory illness.

Conclusion: Although neuromodulators are a major treatment component for SNC, we observed a high frequency of tolerance to these drugs over time. The peripheral action of the tricyclic antidepressants appears to make it more susceptible to this phenomenon. Gabapentin appeared to have a more stable response in our cohort. More work should be done describing this phenomenon in order to provide realistic expectations for this patient population and their caregivers.
ARYTENOID NEUROFIBROMA AS A CAUSE OF DYSPHAGIA

Authors: Raluca Tavaluc, Melin Tan

Institution: Montefiore Medical Center

Presenter: Raluca Teona Tavaluc

Objective: Laryngeal neurofibromas are rare. Their incidence is less than 1% of benign tumors of the larynx. They are most often found in association with Neurofibromatosis I. They are more frequently diagnosed in children as a cause of respiratory distress. We present here an adult patient with a solitary lesion on the arytenoid causing dysphagia.

Method: Case Report

Results: This is a retrospective review of 60-year old female presenting with dysphagia without other significant medical history. During esophagogastroduodenoscopy with gastroenterology for dysphagia, she was seen to have a mass of the arytenoid ball-valving into the esophageal inlet. Laryngoscopic evaluation confirmed this finding. Endoscopic surgical excision with carbon dioxide laser was performed. Diagnosis was confirmed on pathologic evaluation.

Conclusion: Solitary nonplexiform neurofibromas in the larynx, without association with Neurofibromatosis I, are a rare cause of dysphagia.
PHARYNGEAL MUCOUS MEMBRANE PEMPHIGOID FOLLOWING STEM CELL TRANSPLANT

Author: Michael Li

Institution: Ohio State University

Presenter: Michael Li

Objective: To present a case of mucous membrane pemphigoid (MMP) that developed after hematopoietic stem cell transplant (HSCT) and its relevance to Otolaryngology.

Method: We present a patient who developed oral cavity and pharyngeal pemphigoid lesions following HSCT and conducted a review of the literature describing manifestations of primary MMP.

Results: We present a 52-year-old male who underwent HSCT for acute lymphoblastic leukemia. His post-transplant course was complicated by gastrointestinal tract graft versus host disease (GVHD). At initial evaluation, he complained of odynophagia and dysphagia. Examination and fiberoptic laryngoscopy revealed innumerable blisters of the oral cavity and oropharynx, extending to the hypopharynx but sparing the larynx. Immunofluorescence of biopsied tissue showed linear aggregation of IgG and C3 at the basement membrane, suggestive of MMP. Prednisone and rituximab were started with symptomatic improvement.

Discussion: Mucous membrane pemphigoid (MMP) is a vesiculobullous autoimmune disease that may involve the mucosa of the upper aerodigestive tract. The pathophysiology of MMP involves antibody formation against basement membrane hemidesmosomes. It is a rare disease, and in the case of our patient, even more unusual in the setting of comorbid GVHD. The Otolaryngology literature is limited in its description of MMP and is comprised primarily of case reports. Complications can be disastrous as with cases describing esophageal strictures, and tracheal stenosis necessitating tracheostomy. Our experience argues for a multidisciplinary approach necessitating involvement of an Otolaryngologist to screen for and treat complications of MMP that may lead to significant morbidity.
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