12:15 PM  Business Meeting (Fellows/Members Only)

Introduction of New Fellows/Members

Report of the Nominating Committee

Report of the Secretary and Announcements
Lucian Sulica, MD, New York, NY

Report of the Treasurer
Clark A. Rosen, MD, San Francisco, CA

Report of the Editor
Dinesh K. Chhetri, MD, Los Angeles, CA

Report of the Historian
Michael S. Benninger, MD, Cleveland, OH

Special Committee Reports

Other Business

Election of the Council and Organization of New Officers
Welcome
Gady Har-El, MD
New York, NY

Presidential Address:
“From Laryngeal Oncology to Oncologic Laryngology – The ALA and Laryngeal Cancer”
Gady Har-El, MD
New York, NY

Introduction of the Guest of Honor:
Peak Woo, MD
New York, NY

Presentation of Presidential Citations:
Dinesh Chhetri, MD,
Los Angeles, CA
Maxine Cunningham, MBA
Antioch, TN
The New York Laryngological Society
New York, NY

Recognition of the Program Committee:
Dinesh Chhetri, MD
Los Angeles, CA
Yolanda Heman-Ackah, MD
Bala Cynwyd, PA
Natasha Mirza, MD
Philadelphia, PA
Michael Pitman, MD
New York, NY
Susan Thibeault, PhD, CCC-SLP
Madison, WI
VyVy Young, MD
San Francisco, CA
**RESIDENT RESEARCH AWARD**

**Vocal Motor Control and Central Auditory Impairments in Unilateral Vocal Fold Paralysis**

Molly Naunheim, MD*
Katherine C. Yung, MD
Sarah L. Schneider, CCC-SLP*
Jennifer Henderson-Sabes, AuD*
Hardik Kothare, MS*
Srikantan S. Nagarajan, PhD*
Steven W. Cheung, MD*

_San Francisco, CA_

Award Presentation
Gady Har-El, MD

_New York, NY_

**Objectives:** To evaluate differences in vocal motor control and central auditory processing between treated unilateral vocal fold paralysis (UVFP) and healthy control cohorts.

**Study Design:** Cross-sectional comparison.

**Methods:** Ten UVFP study patients treated by Type I thyroplasty with stable voices were compared to 12 control subjects for vocal motor control and complex sound intelligibility. Vocal motor control was assessed using a pitch perturbation reflex task. Complex sound intelligibility was assessed using a central auditory processing battery. Additionally, standard subjective, perceptual, and objective voice measures were assessed.

**Results:** Central vocal motor control impairment was evident and measurable in treated UVFP. At 200 milliseconds following the onset of a pitch feedback perturbation, compensatory vocal response was reduced (p <0.05). The range of pitch variations during normal feedback in study patients was correlated with the magnitude of the compensatory vocal response. Impaired compensatory vocal responses were observed despite demonstrated capacity in UVFP study patients to perform the vocal motor task at a level comparable to controls. The timing of the vocal motor control error suggests auditory processing impairments in UVFP patients. Concomitantly, UVFP patients exhibited central auditory processing impairments (p=0.035), especially for temporal compression and added noise challenges.

**Conclusion:** The combined central vocal motor control and auditory processing impairments demonstrate reciprocal interdependency of sensory and motor systems. Apparent isolated peripheral injury to the larynx has far reaching consequences that impact central motor control and auditory functions. Comprehensive treatment of UVFP may require novel approaches that also optimize central auditory processing performance.
Introduction: Nimodipine is a calcium channel blocker that has been used to treat hypertension and vasospasm. Emerging evidence in the literature suggests that it is neuroprotective by reducing cellular apoptosis after neural injury and promoting axonal sprouting at the nodes of Ranvier.

Objectives: To conduct a systematic review of the usage of nimodipine in cranial nerve injury and to perform a meta-analysis to estimate the efficacy of nimodipine on injured cranial nerve functional recovery. Methods: Literature search was performed in 8 databases using PRISMA guidelines. Publications that used nimodipine as a monotherapy for treating cranial nerve injury were included for review. Cranial nerve function recovery was the primary outcome measure.

Results: 68 full texts in English were assessed. 25 studies were included in the final review. Six of these including 121 participants who received nimodipine for either RLN or facial nerve injury and 531 controls were used for meta-analysis. Nimodipine significantly increased the odds of vocal fold motion recovery (OR 20.0, 95% confidence interval [CI] 10.5, 38.1, p < 0.01), and the odds of facial motion recovery (OR 10.4, 95% CI 1.2, 86.9, p = 0.03). Overall, nimodipine-treated patients had significantly higher odds of recovering vocal fold or facial motion compared with controls (OR 13.0, 95% CI 4.1, 41.4, p < 0.01).

Conclusions: Existing evidence supports the positive effect of nimodipine on vocal fold and facial motion recovery after injury. Future research should focus on randomized clinical trials comparing recovery rates between nimodipine- and placebo-treated groups.
Introduction: Dynamic voice computerized tomography (DVCT) is a novel technique that provides complementary information to characterize laryngeal function for patients with complex airway history that may alter surgical decisions. The study goals were to evaluate the impact of DVCT on decision making for reconstructive voice surgery for a cohort of post-airway reconstruction dysphonia patients.

Methods: Retrospective chart review at a pediatric tertiary center for patients with history of complex airway surgery and subsequent reconstructive voice surgery for dysphonia between 01/2010-04/2016. Study group had a DVCT prior to surgery while control group underwent surgery without a DVCT.

Results: Twenty-one patients were analyzed (12 female, 57.1%) with a mean age of 13.9±7.7 year-old. Ninety percent (19/21) had a prior tracheostomy and a mean of 2.6±1.3 airway surgeries. Thirteen patients (61.9%) underwent DVCT prior reconstructive voice surgery. CAPE-V baseline scores were similar between study (49.1±4.6) and controls (57.1±6.0,P=0.72). Scores considerably improved for the study group after voice surgery (31.3±5.4,P<0.0001) while controls did not improve (57.8±5.7,P=0.99). Postsurgical improvement was significantly better for study patients(P=0.002). Baseline VHI scores were similar between both groups:54.0±5.4 vs 52.3±6.2, respectively(P=0.99). Postsurgically, VHI scores were also similar between both groups (46.1±7.1 vs 52.3±5.5,P=0.77).

Reconstructive voice surgeries for study patients included posterior cricoid reduction (46.2%), vocal fold medialization/augmentation(46.2%) and laryngeal reinnervation(7.7%) while all controls underwent a single treatment (medialization/augmentation).

Conclusion: Patients with DVCT were more likely to improve. This suggests that DVCT altered surgical decision-making and allowed improved tailoring of reconstructive surgery to specific patients needs. DVCT could represent a key tool for complementary information prior reconstructive surgery.
Objectives: Vocal fold paralysis/paresis (VFP) is an uncommon but serious complication of esophagectomy. The objectives of this study were to: 1) identify the prevalence of VFP and associated complications after esophagectomy in the United States, and 2) determine the utility and relative cost of engaging otolaryngology-head & neck surgery and speech-language pathology (OHNS/SLP) in the management of these patients.

Methods: The National Inpatient Sample (NIS) represents a 20% stratified sample of discharges from US hospitals. Using ICD-9 codes, patients undergoing esophagectomy between 2008 and 2013 were identified in the NIS. Subcohorts of patients with VFP and those who utilized OHNS/SLP services were also identified. Weighted logistic regression models were used to compare binary outcomes such as in-hospital death and other complications; generalized linear models were used to compare total hospital charges and length of stay (LOS).

Results: We studied 10,896 discharges, representing a weighted estimate of 52,610 patients undergoing esophagectomy. The incidence of VFP after esophagectomy was 1.96%. Compared to those without VFP, patients with VFP had a higher incidence of postoperative pneumonia, more medical complications, and were more likely to undergo tracheostomy; hospital charges and LOS were also higher. In all patients, in-hospital mortality was associated with age >80, aspiration pneumonia, and the incidence of more medical and surgical complications. Of the patients with VFP, 35.0% received OHNS/SLP intervention.

Conclusion: VFP after esophagectomy is associated with postoperative complications, prolonged LOS, and higher hospital costs. OHNS/SLP intervention in the setting of VFP may help to mitigate the effects of these complications without significant increase in cost or LOS.
Introduction: Voice outcomes following medialization laryngoplasty (ML) for unilateral vocal fold paralysis (UVFP) were compared to those that underwent ML plus arytenoid adduction (AA).


Results: Of 236 patients, 127 met study criteria. Of those, 76 (60%) underwent ML, age 63±14 years, male=34 (45%), and 51 (40%) underwent ML+AA, age 58±14 years, male=21 (41%). Patients completed VHI-10 at baseline, n=127 (100%), 3-months, n=110 (87%) and/or 12 months n=58 (46%). No group differences were found for sex (p=0.69) or occupation (p=0.77). Baseline differences were found for year of ML (p<0.001), age at ML (p=0.043), and prior vocal surgery (p=0.03). Baseline VHI-10 scores for ML+AA (29±7) were worse compared to ML alone (24±7 p<0.001). At 3 months VHI-10 scores improved (14±9, p<0.001) with ML+AA scores (12±9) showing greater improvement compared to ML (15±10, p<0.001) though the magnitude of difference reduced after controlling for baseline differences (p=.088). At 12 months overall VHI-10 scores also improved compared to baseline (15±10, p<0.001), again showing greater improvement for ML+AA group (10±8) compared to ML (18±10, p<0.001). This difference persisted after baseline controls (p=0.005). Maximum phonation times and perceptual voice measures are reported.

Conclusions: Based on current findings, patients that undergo ML+AA likely have greater voice handicap at baseline compared to those undergoing ML alone. Additionally, raw VHI-10 scores suggest that the addition of AA may improve voice outcome measures with those improvements persisting for at least 12 months. Further work is needed identify best candidates for AA.

Discussion
SCIENTIFIC SESSION II: Airway Stenosis and Injury

Moderators:
Michael Pitman, MD, New York, NY
Alexander Hillel, MD, Baltimore, MD

2:11 PM  Nationwide Estimations of Tracheal Stenosis Due to Tracheostomies
Romaine F. Johnson, MD, MPH*
Dallas, TX

Introduction: Tracheal stenosis is a recognized complication of tracheostomy. Yet, the incidence and demographics of tracheal stenosis due to tracheostomies has infrequently been studied. We hypothesized that stenosis due to tracheostomy is rare but more common among older patients and women.

Methods: We performed a cross-sectional analysis of US emergency department visits, hospital discharges, and readmissions using the 2013 National Emergency Department Sample, 2013 National Inpatient Sample, and the 2013 Nationwide Readmission Database for patients with tracheal stenosis due to tracheostomies. Also, we queried the readmission database for new tracheostomy patients who were readmitted within the same calendar year with tracheal stenosis due to the tracheostomy tube.

Results: There were an estimated 6156 ED visits, 4920 hospital discharges, and 1209 readmissions for tracheal stenosis due to tracheostomies in 2013. These cases represented 28% of all tracheostomy-related complications. Of the 103,484 patients who underwent tracheostomy in 2013, 1107 (1.1%) patients were readmitted within the calendar year with tracheal stenosis due to the tracheostomy tube. These stenosis patients' average age was 55 years old. They were 45% female, and 60% White. The mortality rate was 7.9%. The demographic risk of stenosis mirrored the risk of tracheostomy -- increasing age, male gender, and Black ethnicity.

Conclusions: Tracheal stenosis due to tracheostomy was uncommon accounting for 1% of readmissions after tracheostomies although it represented 28% of tracheostomy-related complications and had a high mortality rate. The risk of stenosis reflected the overall tracheostomy population without apparent age, gender, or racial predilections.
Introduction: Laryngotracheal stenosis (LTS) is a rare but resource intense disease. It’s a common physiological endpoint to multiple etiologies. The cost of LTS has not been adequately explored. We aim to 1) describe healthcare costs of LTS 2) identify key risk factors for increased cost and 3) conduct a cost-effectiveness analysis (CEA) to determine the role of cricotracheal/tracheal resection (CTR/TR) in the treatment of LTS.

Methods: 34 LTS patients (17 iatrogenic LTS [iLTS], 17 idiopathic LTS [iSGS]) were recruited from Johns Hopkins between April 2013 and March 2017. Annual costs were calculated using charges from the Department of Otolaryngology. A CEA was conducted to compare CTR/TR vs. endoscopic dilation. Procedures are considered cost-effective if they fall below an incremental cost-effectiveness ratio (ICER) of $100,000/Quality Adjusted Life Year (QALY), or cost less but result in higher QALYs.

Results: LTS patients were charged $15,801.81 (+/− $2,209.30) annually for related healthcare visits. Compared to iSGS patients, iLTS patients had significantly higher annual costs ($20,502.97 vs. $11,100.65, p=0.03). The cost of CTR/TR was $33,376 (+/− $8,613). Over a 5-year time horizon, CTR/TR has an ICER of $610/QALY and is cost-effective compared to serial dilations. Over a 10-year time horizon, CTR/TR has a lower cost and higher QALY than endoscopic dilation.

Conclusions: Treatment for iLTS is significantly more costly than iSGS. CTR/TR contributes to this higher cost but represents successful intervention in iLTS patients refractory to endoscopic dilation. Over a 5- and 10-year horizon, CTR/TR is cost-effective compared to endoscopic dilations in appropriately selected patients.
Drug Eluting Laryngeal Stents in a Mouse Model of Laryngeal Stenosis

Jason L. Yu, MD*
Natasha Mirza, MD
Pratyusha Yalamanchi, BS*
Philadelphia, PA

Introduction: Subglottic stenosis secondary to injury carries major long term morbidity. We have developed a murine model to study subglottic stenosis and showed decreased inflammatory responses with use of intraperitoneal injections of dexamethasone. Given our previous work, we proposed to implant drug-eluting stents into our mouse model to study local effects of sustained drug release.

Methods: Drug-eluting stents were created using polyethylene-co-vinyl acetate polymer (PEVA). 1.5 grams of PEVA pellets and 7.5mg of dexamethasone were dissolved into 10 mL of dichloromethane. The dichloromethane was then evaporated leaving the formed plastic which was shaped for implantation. Larynges were harvested from C57JL/J6 mice and injured using hydrochloric acid. Stents were then inserted into the larynx. Stented larynges and controls were implanted onto the backs of syngeneic mice and harvested at 3 weeks. Laryngeal were sent for both H&E staining and q-PCR looking at mRNA expression of inflammatory markers.

Results: H&E staining showed no significant differences in markers of inflammation. Moreover, there was no significant differences in expression of TGF-β and IL-2.

Conclusion: The results of our work show the difficulty in studying the use of drug eluting stents in the mouse model. There was no significant effect on use of laryngeal stents in improving the inflammatory response. Future studies can further look into different stent materials or medications that could modify the wound healing response.
Introduction: Inhalation injury is an independent risk factor in burn mortality, imparting a 20% increased risk of death. Yet there is little information on the natural history, functional outcome, or pathophysiology of thermal injury to the laryngotracheal complex, limiting treatment progress.

Methods: Case series (n=3) of significant thermal airway injury.

Results: In all cases, the initial injury was far exceeded by the subsequent immune response and aggressive fibro-inflammatory healing. Serial examination demonstrated progressive epithelial injury, mucosal inflammation, airway remodeling, and luminal compromise. Histologic findings in the first case demonstrate an early IL-17A response in the human airway following thermal injury. This is the first report implicating IL-17A in the airway mucosal immune response to thermal injury. Our 2nd and 3rd patients received Azithromycin targeting IL-17A and had showed clinical responses. The third patient also presented with exposed tracheal cartilage and underwent mucosal reconstitution via split-thickness skin graft over an endoluminal stent in conjunction with tracheostomy. This was associated with rapid abatement of mucosal inflammation, resolution of granulation tissue and return of laryngeal function.

Conclusion: Patients who present with thermal inhalation injury should receive a thorough multidisciplinary airway evaluation, including early otolaryngologic evaluation. New early endoscopic approaches (scar lysis, and mucosal reconstitution with autologous grafting over an endoluminal stent), when combined with targeted medical therapy aimed at components of mucosal airway inflammation (local corticosteroids and systemic Azithromycin targeting IL-17A) may have potential to limit chronic cicatrical complications.

2:35 PM Discussion

2:45 PM Break/Visit Exhibits
Objective(s). Our laboratory and others have suggested that Smad3 is a principle mediator of the fibrotic phenotype in the vocal folds (VF), and we hypothesize that alteration of Smad3 expression through short interfering (si) RNA likely holds therapeutic promise, yet delivery remains challenging. To address this issue, we employed a novel synthetic oligomer, lipitoid, complexed with siRNA to improve stability and cellular uptake with the goal of increased efficiency of RNA-based therapeutics.

Methods. In vitro, lipitoid cytotoxicity was quantified via colorimetric and LIVE/DEAD assay in immortalized human vocal fold fibroblasts and primary rabbit vocal fold fibroblasts. In addition, optimal incubation interval and solution for binding siRNA to lipitoid for intracellular delivery were then determined. In vivo, a rabbit model of vocal fold injury was then employed to evaluate Smad3 knockdown using locally injected lipitoid-complexed siRNA.

Results. In vitro, lipitoid did not confer additional toxicity compared to commercially available reagents. In addition, 20 minute incubation in 1xPBS resulted in maximal Smad3 knockdown. Smad3 expression increased following VF injury. This response was significantly reduced in injured vocal folds at 4 and 24 hours following injection (p=0.035 and 0.034, respectively).

Conclusion. The current study is the first to demonstrate targeted gene manipulation in the VFs as well as utility of lipitoid for localized delivery of genetic material in vivo. Ideally, these data will serve as a platform for future investigation regarding the functional implications for therapeutic gene manipulation in the vocal folds.
Background: This study investigated the ability of Conditioned media (CM) from human nasal inferior turbinate-derived mesenchymal stem cell (hTMSC) to repair injured vocal folds. We used quantitative real-time polymerase chain reaction (PCR) to analyze the early phase of wound healing, in xenograft animal models.

Methods: The right-side lamina propria of the vocal fold was injured in 30 rats. Next, CM from hTMSC was injected into half of the injured vocal folds (CM groups). As a control, phosphate-buffered saline (PBS) was injected into the other half of the injured vocal folds (PBS groups). Rat vocal folds were harvested for PCR at 1 week after injury.

Results: In the CM group, PCR showed that procollagen III expression was significantly downregulated compared with the PBS group. Hyaluronan synthase, Fibronectin, transforming growth factor(TGF) - β1 and hepatocyte growth factor were upregulated compared with the PBS group. However, the differences did not attain statistical significance.

Conclusions: Injection of conditioned media into injured vocal folds showed anti-fibrotic effect in early phase of wound healing. These results provide a foundation for future clinical use of CM for vocal fold regeneration.
Wound Healing after Transoral Angiolytic Laser Surgery for Early Glottic Carcinoma

Lauren F. Tracy, MD*
Tiffany Hron, MD*
Jarrad Van Stad, PhD, CCC-SLP*
James A. Burns, MD
Boston, MA

Purpose: Wound healing after transoral angiolytic laser surgery for early glottic cancer was analyzed to identify factors influencing healing and clinical significance of persistent granulation tissue.

Methodology: A retrospective review of 100 consecutive patients undergoing endoscopic angiolytic laser surgery for T1 and T2 glottic carcinoma was done. Patients with prior radiation or incomplete data were excluded. Post-operative endoscopies within the first 6 months were analyzed for time to healing, size and location of wound, and oncologic findings. Three blinded, independent raters graded wound appearance and presence of granulation tissue.

Results: Seventy-seven patients healed without need for intervention at a median of 3.5 months. Four patients had office-based ablation of granulation without biopsy and healed. The remaining 19 patients had biopsy for granulation tissue. Wounds that underwent biopsy at >3 months were more likely to contain carcinoma (5/6 patients, 83%) than wounds that were biopsied <3 months (2/13 patients, 15%) (p=0.004). Presence of granulation significantly correlated with resection involving anterior commissure (p=0.02), entire vocal fold length (p=0.03), and depth into muscle (p=0.002). Delayed healing (>3 months) correlated with T2b tumors (p=0.03) and anterior commissure involvement (p=0.04). T1a cancers more commonly healed <3 months (p=0.005). Inter-rater grading agreement was moderate to substantial (?=0.51-0.81).

Conclusion: Most vocal fold wounds heal completely within 3 months after angiolytic laser surgery for early glottic cancer. Larger and deeper wounds are more likely to heal with granulation tissue. Granulation can resolve without surgical intervention; however, granulation present >3 months warrants biopsy due to increased risk of malignancy.
Investigation of Surgical Adhesives for Vocal Fold Wound Closure
Karen M. Kost, MD
Maxence Coulombe, DEC*
Luc Mongeua, PhD*
Almoaid Rammal, MD*
Montreal, QB, CANADA

Introduction: Phonosurgical excision of benign vocal fold lesions may result in scar formation, with permanent dysphonia. Surgical adhesives are increasingly used in vocal fold microsurgery to assist in wound closure and reduce the risk of scar formation. Currently used vocal fold adhesives such as fibrin glue, however, have a low tensile strength and are not very effective in promoting wound closure or reducing scarring.

Objectives: To investigate both the mechanical strength and the cellular response to three different surgical adhesives. Methods: Three commercially available adhesives were investigated: Glubran2, BioGlue, and Tisseel. Porcine larynges were harvested immediately post mortem and stored at -80 °C. Shear and tensile traction tests were performed to investigate the adhesive strength of the adhesives following standardized procedures (ASTM F2255-05 & ASTM F2258-05). The tests were performed on 150 larynges in humid conditions at 37°C. The cytotoxicity of the adhesives to immortalized vocal fold fibroblasts (IVFF’s) was also investigated.

Results: The results showed that all three surgical adhesives had a higher failure strength under shear loading than under tension loading. The maximum failure strength in shear or tension of the three surgical adhesives ranked from strongest to the weakest was: 1) Glubran2; 2) BioGlue; and 3) Tisseel. Tissel was found to be the least toxic of the three adhesives, while Glubran2 was the most toxic.

Conclusions: Glubran2 was found to have the best adhesive strength, while Tisseel was the least toxic. There seems to be a tradeoff between adhesive strength and toxicity.
Expression of Trophic Factors Receptors during Reinnervation after Recurrent Laryngeal Nerve Injury

Ignacio Hernandez-Morato, PhD*
Likun Tan*
Michael Montalbano, BMus*
Michael E. Pitman, MD
New York, NY

Introduction: Injury of the recurrent laryngeal nerve (RLN), results in synkinetic reinnervation with vocal fold immobility. Netrin-1 and GDNF overexpression is observed in denervated laryngeal muscles, yet the production of their receptors within motoneurons (MN) is unclear. The aim of this study is to evaluate the production of Netrin-1 and GDNF receptors following RLN injury.

Methods: In 32 rats, the right RLN was severed and reanastomosed. The left side was the control. In group 1, dextran amine tracer was applied to the nerve stump. In group 2, cholera toxin (CtB) was injected into the right posterior cricoarytenoid (PCA) (CtB-AF488:green) and thyroarytenoid muscles (TA) (CtB-AF594:red). Brainstems were harvested 3, 7, 14, 21 days post injury (DPI) and immunostained for Netrin-1 receptors (DCC, UNC-5) and GDNF receptors (Ret, GFRα1,2 and 3). The presence of receptors and their position in adductor or abductor MN was analyzed.

Result: Changes in the pattern of Netrin-1 and GDNF receptor production were observed in the ipsilateral MN versus controls following RLN injury. DCC was produced at 3DPI in the TAMN and PCAMN, UNC-5 in PCAMN at 7DPI. All GDNF receptors were expressed in both the PCAMN and TAMN.

Conclusion: Netrin-1 and GDNF receptor production increases after RLN injury. Netrin-1 receptor DCC is attractive and in the PCAMN and TAMN early, while UNC-5 is repulsive and expressed in the PCAMN at 7DPI, the same time when axon innervation ends in the PCA and shifts to the TA. This correlation suggests Netrin-1 may play a role in axon guidance after RLN innervation.
Laryngeal Adductor Function following KTP Laser Welding of the Recurrent Laryngeal Nerve

Neel K. Bhatt, MD*
Randal C. Paniello, MD, PhD
St. Louis, MO

Introduction: Recurrent laryngeal nerve (RLN) transection injuries may occur during thyroidectomy and other surgical procedures. Laser nerve welding has been shown to cause less technique-related axonal damage than the traditional suture method. We compared functional adductor results using these two methods of RLN repair.

Method: Canine hemilarynges underwent pretreatment testing of laryngeal adductor function, followed by RLN transection and repair using KTP laser welding (n=8) or microneural suture (n=16) techniques. Six months later, adductor function was measured again and expressed as a proportion of the pretreatment value.

Results: The mean laryngeal adductor pressure ratios were 82.4 ± 13.8% for the laser repair group and 55.5 ± 12.5% for the suture control group (p<0.001). Also, both spontaneous and stimulated glottic closure was observed to be tighter in the laser welding group.

Conclusion: Laser nerve welding resulted in greater strength of adduction than suture repair of an acutely transected RLN. This result likely indicates a greater number of axons successfully regenerated across the anastomosis in the laser group. Suture anastomosis may traumatize more axons than the laser. Stronger vocal fold adduction is associated clinically with better protection from aspiration and improved voice outcomes. KTP laser welding should be considered for anastomosis of the RLN and other nerves.

Discussion
4:00 PM  American Laryngological Association Award
Eiji Yanagisawa, MD
Woodbridge, CT

Presentation: Ellen Friedman, MD
Houston, TX

4:05 PM  Gabriel F. Tucker, MD, Award
Noel Garabédian, MD*
Paris, FRANCE

Presentation: Reza Rahbar, MD
Boston, MA
4:10 PM  Panel Discussion
LEMG: What’s all the Fuss?

Moderator: Allen Hillel, MD, Seattle, WA

Topics and Panelists:
“LEMG: Why it is not essential for a laryngologist?”
Allen Hillel, MD, Seattle, WA

“LEMG: How do I incorporate LEMG into my practice?”
Yolanda Heman-Ackah, MD, Bala Cynwyd, PA

“Is LEMG necessary to diagnose Vocal Fold Paresis?”
Peak Woo, MD, New York, NY

“What does LEMG tell me that I already don’t know?”
Clark Rosen, MD, San Francisco, CA

5:00 PM  Announcements/Adjournment

5:01 PM  Neurolaryngology Study Group
Topic:  Spasmodic Dysphonia: Past, Present and Future
Speaker: Christy Ludlow, PhD*
Madison, WI
8:00 AM Molecular and Immunologic Analysis of Tumors from Non-Smokers with Laryngeal Squamous Cell Carcinoma
Ian-James Malm, MD*
Lisa M. Rooper, MD*
Justin A. Bishop, MD*
Alexander T. Hillel, MD
Lee M. Akst, MD
Simon R. A. Best, MD
Baltimore, MD

Background: Laryngeal squamous cell carcinoma (LSCC) is strongly associated with tobacco use, but several studies have identified a cohort of patients without traditional risk factors who nonetheless develop LSCC, suggesting an alternative etiology. The purpose of this study was to compare immunohistochemical markers in tumor specimens from non-smokers and smokers with LSCC.

Methods: Non-smokers with LSCC at Johns Hopkins Hospital between 2003-2013 were stage and age-matched to control smokers with LSCC. A tissue microarray (TMA) was constructed and stained for numerous IHC markers.

Results: The TMA was composed of 14 non-smokers and 20 smokers with LSCC in triplicate samples. The average age of the non-smoking and smoking cohort was 58.4 and 60.0 (p=0.9). Of the 34 total patients, only 5 were p16 positive (3/14 non-smokers; 2/20 smokers). Two of those patients were positive for HPV via in situ hybridization (ISH). There was no correlation between smoking status and p16 (p=0.36) or HPV-ISH positivity (p=0.79). PD-L1 expression did not correlate with smoking status (p=0.27) or p16 positivity (p=0.15). PTEN expression also did not correlate with smoking status (p=0.91) or p16 positivity (p=0.24). Tumors that were p16+ had a higher ratio of CD3+ tumor infiltrating lymphocytes (p=0.005), although there was no correlation with smoking status.

Conclusion: In a stage and age-matched cohort of smokers versus non-smokers with LSCC, there does not appear to be a differential pattern of expression for common molecular and immunologic markers. HPV does not appear to be a major causative etiology in the non-smoking patient with LSCC.
Background: Although previous research has demonstrated the safety of tracheoesophageal puncture (TEP) prosthesis placement in radiated patients, there is a growing population of twice-radiated patients with limited research on the outcomes of TEP-placement in this cohort.

Methods: After Institutional Review Board approval, a retrospective review of 96 patients who underwent TEP prosthesis placement from 2006 to 2017 at University Hospitals Cleveland Medical Center was conducted, of which 18 patients underwent two courses of radiation. Outcome measures included prosthesis removal, return to the operating room, repuncture, and duration of TEP utilization.

Results: Of the 18 patients who underwent re-irradiation, eight (46%) had ultimate removal of their TEP prosthesis with removal occurring at an average of 27.1 months. Reasons for removal included widening tracheoesophageal fistula (n=5), local recurrence (n=2), and dysphagia/esophageal stenosis (n=1). Five patients (28%) required TEP-related surgical intervention. In a comparative cohort of sixty-seven once-radiated patients, eleven (16%) had their prosthesis removed. This was statistically fewer than the twice-radiated group (p=0.009, RRR= 2.7, 95% CI= 1.28 - 5.71). Reasons for removal were also different and included patient preference (n=5), persistent leakage (n=2), recurrence (n=2), enlarging tracheoesophageal fistula (n=1), and dysphagia (n=1). Eight patients (12%) required TEP-related surgical intervention (p=0.097). TEP removal occurred at an average of 16 months (p=0.7).

Conclusions: Our study uncovered a significantly higher incidence of TEP prosthesis-discontinuation in twice-radiated patients compared to once-radiated patients. Further characterization of differences in these populations is needed. Alternative means of communication may be more beneficial for this high-risk patient population.
Objective: Intractable aspiration can result in aspiration pneumonia and PEG tube dependence. Aspiration often occurs due to residual spillover into the larynx after an incomplete swallow attempt. We present a new supraglottoplasty procedure for the treatment of intractable aspiration by improving the supraglottic laryngeal height.

Material and Methods: Trans-oral tubed supraglottoplasty is performed by suspension laryngoscopy without tracheostomy. The Inter-arytenoid mucosa is incised from the inter-arytenoideus to the aryepiglottic fold. This creates two mucosal flaps. A releasing incision is made on the aryepiglottic fold on each side. The laryngeal side of the supraglottic mucosa is closed using a V-lock running suture. The pharyngeal side of the supraglottic mucosa is closed as a second layer. This procedure raises the posterior larynx wall by 2 cm, thereby reducing spillover and aspiration.

Results: This procedure was performed successfully in nine patients (eight male and one female) with intractable aspiration despite prior procedures. Average patient age was 76 years (69-82) with an average follow-up period of 20 months (3-60 months). Pre-operative gastrostomy tube was successfully removed in 86% (6/7) patients.

Conclusion: Trans-oral Tubed Supraglottoplasty is a novel, minimally invasive procedure to improve supraglottic laryngeal height. It can serve as an adjunctive procedure to reduce penetration and aspiration in the elderly with incomplete swallow.
Introduction: Reflux disease is common in the outpatient population presenting with dysphagia. Despite its prevalence, the impact of reflux disease on oropharyngeal swallowing function is not well defined. This study uses objective measures of swallowing function from modified barium swallow studies to describe the pathophysiology of dysphagia in a group of patients whose only associated condition is reflux.

Methods: The Swallowing Database at the University of Utah was queried for patients with a diagnosis of reflux without additional conditions known to impact swallowing function. Total pharyngeal transit time (TPT), distance of hyoid elevation (Hmax), maximum opening size of the upper esophageal sphincter (UESmax), area of pharynx at maximum constriction (PAMax), the timing of airway closure relative to the arrival of the bolus at the UES, and Penetration/Aspiration (Pen/Asp) score were assessed.

Results: 122 patients met criteria for inclusion in the study. 52 (42%) patients had normal pharyngeal swallowing function. 70 patients (57%) had at least one abnormal swallowing measure and 58 (47.5%) demonstrated a delay in airway closure relative to arrival of the bolus at the UES. The incidence of prolonged TPT, diminished Hmax, poor UESmax, and enlarged PAMax was 2.5%, 8%, 4%, 11.5% respectively. 60% with a delay in airway closure had a normal Pen/Asp score.

Conclusion: A delay in airway closure relative to the arrival of the bolus at the UES is the most common abnormality found in patients with reflux-associated dysphagia and is often not identified by the Pen/Asp score.
Introduction: The efficacy of laryngeal reinnervation on voice has been extensively studied, but there is a paucity of literature on its impact on swallowing function. The goal of this study was to investigate the impact of laryngeal reinnervation on swallowing outcomes among unilateral vocal fold paralysis (UVFP) patients.

Method: We reviewed 22 UVFP cases of laryngeal reinnervation from our institution. Thirteen patients had complete datasets, including duration of denervation, Eating Assessment Tool (EAT-10), Reflux Symptom Index (RSI) and Voice Handicap Index (VHI) scores. Wilcoxon signed-rank test was used to compare pre- and postoperative scores.

Results: Over the study period, 13 cases (mean age 42.1 ± 14.6 years; 8/13 men) with UVFP underwent ansa cervicalis to RLN anastomosis (9/13) or nerve-muscle pedicle (4/13). The median time between injury and reinnervation was 13.7 months (range 1.2–88.5 months). Twelve patients (92%) had an improved (8/13; 62%) or stable (4/13; 31%) EAT-10 score postoperatively. While the median EAT-10 score improved only modestly, from 3 to 2, this difference was statistically significant (z = -2.079, p < 0.038).

Conclusion: Even though laryngeal reinnervation is not thought of as a treatment for dysphagia, it is associated with a modest improvement in the EAT-10 score in patients after surgery for hoarseness in the setting of UVFP.
8:40 AM  Auditory-Perceptual and Acoustic Evaluation of the Effects of Deep Brain Stimulation on Voice in Dystonia Patients

Lyndsay L. Madden, DO
Mary E. Finger*
Ihtsham U. Hag, MD*
Amy K. Morris, MM, MA, CCC-SLP*
S. Carter Wright Jr., MD*
Mustafa S. Siddiqui, MD*
Winston-Salem, NC

Introduction: To determine the effects of Globus Pallidus Interna (GPI) Deep Brain Stimulation (DBS) on voice quality and pitch of patients with primary medically refractory (non-focal) dystonia.

Methods: The voices of fourteen patients aged ≥18 years (males=7 and females=7) with dystonia (DYT1 dystonia=4, cervical dystonia=6, and generalized dystonia=4) who had bilateral GPI DBS were assessed. Three blinded raters (two fellowship-trained laryngologists and one speech language pathologist specialized in voice) evaluated audio recordings of each patient’s pre and post-DBS reading of a standardized passage and sustained vowel phonation. Perceptual rating of voice quality was completed using the Grade, Roughness, Breathiness, Asthenia, Strain (GRBAS) scale. Pitch range measurements (Speaking Fundamental Frequency (SF0), Mean Frequency (MF0), and Standard deviation (SD)) were also evaluated. Inter-rater reliability for the perceptual voice rating was assessed using the kappa coefficient.

Results: Perceptual parameters showed significant improvements in Grade (p=0.0211), Roughness (p=0.0011), and Strain (p=0.0035) at 12 months post-implantation. SF0, MF0, and SD all decreased at 6 and 12 months with significant changes in SF0 (p=0.0139) and MF0 (p=0.0098) at 12 months. Grade and strain were found to have “nearly perfect” and “substantial” inter-rater agreement (0.84 and 0.71, respectively).

Conclusions: Following DBS implantation for dystonia, patients had improvement in voice across several auditory-perceptual parameters. Decreases in pitch measurements were also identified. DBS implantation in the GPI may emerge as a treatment option as we investigate the implications for patients with primary vocal (focal) dystonias.
Introduction: Vocal tremor is an uncommon diagnosis that can be treated with laryngeal botulinum toxin injections (LBTX); we seek to describe our experience with this modality.

Method: Retrospective chart review was performed of all patients with a primary diagnosis of vocal tremor treated with LBTX from 2012 through 2017.

Results: Twenty-one patients were included (mean age 69 years, 100% female). Thirteen patients (62%) had a minor component of spasmodic dysphonia in addition to their tremor. Fourteen patients had vertical and horizontal components to their tremor, and two had horizontal tremor alone. The remaining five patients did not have clear characterization of their tremor. A total of 50 injections were reviewed (26 thyroarytenoid (TA), 24 thyroarytenoid and strap muscle (TA+S)) and patients reported subjective voice benefit with 48 of these (96% overall, 92% TA, 100% TA+S). When available, the postprocedural change from baseline Voice Handicap Index-10 (VHI-10) and Consensus Auditory Perceptual Evaluation of Voice (CAPE-V) scores were calculated (mean 2.5, 6.9 overall; -3.6, -2.9 TA; -1.5, -10.3 TA+S) and indicated improvement. Subjective patient improvement ratings (scale 0-100%) were obtained for 47 injections, with a mean of 70% improvement per injection. Of patients with both horizontal and vertical tremor (31 injections), outcomes were improved with TA+S injection vs TA alone (mean improvement 74% vs 35%, p=0.005).

Conclusions: There is utility in the characterization of vertical and horizontal components of vocal tremor. Patients with both have increased benefit with injection of strap muscles in addition to thyroarytenoid muscles.
As we enter into an aging society around the world, patients with laryngeal atrophy and dysfunction are increasing. Patients with decreased laryngeal function have symptoms of voice change, dysphagia, and aspiration pneumonia, which not only decrease the patient’s quality of life, but also affects their lives. Although injection laryngoplasty has been widely performed for the treatment of glottic insufficiency, it cannot recover intrinsic microstructure of vocal fold. Thus, we fabricated an injectable alginate/hyaluronic acid hydrogel loaded with bFGF for inducing rejuvenation of aged laryngeal muscle. We fabricated bFGF–loaded alginate/hyaluronic acid hydrogel for injection laryngoplasty and identified bFGF release profile from the hydrogel. After 1 month and 3 months of injecting the hydrogel into laryngeal muscle of 18-month-old rat, rejuvenation efficacy of the bFGF-loaded hydrogel was evaluated by qPCR, histology, immune-fluorescence staining and functionality analysis. bFGF-loaded hydrogel induced an increase in expression of myogenic regulatory factor-related genes, decrease of interstitial fibrosis, hypertrophy of muscle fiber, proliferation of muscle satellite cells, and angiogenesis. In addition, bFGF-loaded hydrogel led successful vocal-gap-closure in the functionality analysis using high-speed camera. Therefore, bFGF-loaded alginate/hyaluronic acid hydrogel can be an excellent candidate for laryngoplasty with therapeutic effect for the rejuvenation of aged larynx.
Objectives: An aging population has increased focus on geriatric otolaryngology. Recent gerontology literature emphasizes that physiologic differences between young-old (65-74), middle-old (75-84), and old-old (>85) patients mean that patients ≥65 years are not a uniform population. This study evaluates differences among dysphonia patients ≥65 relative to diagnosis and voice-related quality-of-life (VRQOL).

Methods: A retrospective chart review of all new patients ≥65 presenting to a University-based specialty voice center between April 2015-March 2017 identified chief complaint, diagnosis, and self-reported voice handicap. Analysis evaluated diagnoses and VRQOL as functions of patient age.

Results: Of 841 new patients ≥65, 461 reported chief complaint of dysphonia. Of these, 91 (19.7%) had diagnosis of vocal fold atrophy. When comparing the oldest half of this cohort (age =73) to the youngest half (age <73), older patients were more than twice as likely to have vocal fold atrophy; younger patients were more than twice as likely to have neurologic dysphonia and 1.7 times as likely to have benign vocal fold lesions (Pearson chi-square, p=0.002). Linear regression found that every additional year of age increased odds of vocal fold atrophy by 6% (OR 1.10, 95% CI 1.02-1.10), but decreased odds of benign lesion by 5% (OR 0.95, 95% CI 0.90-0.99). VRQOL scores were similar across young-old, middle-old, and old-old.

Conclusions: Dysphonia patients ≥65 are not a uniform group, and important differences exist in diagnosis as a function of age. Knowledge of these differences may inform further investigations in the growing field of geriatric otolaryngology.

Discussion
9:13 AM  INTRODUCTION OF THE STATE OF THE ART LECTURER
Gady Har-El, MD
New York, NY

9:17 AM  STATE OF THE ART LECTURE
“The State of the Art in Managing Conflicts and Disruptive Behavior in Surgery”
Melina Kibbe, MD*
Chapel Hill, NC

9:45 AM  Break/Visit exhibits
Objectives: Current functional laryngeal imaging modalities including mirror laryngoscopy, flexible fiberoptic or rigid endoscopy ± stroboscopy and HD high-speed video are limited to analysis of structural features and mucosal wave kinematics at the vocal fold (VF) surface only. To date, descriptive analysis of in vivo human VF motion in the coronal cross-sectional plane has not been reported. We present the use of vertical cavity surface-emitting laser (VCSEL) optical coherence tomography (OCT), a micrometer-resolution imaging modality to accomplish this task.

Methods: We constructed a swept-source VCSEL OCT system to perform transoral laryngeal imaging in healthy adult patients. A Python-based algorithm was designed to automatically segment and measure VF epithelial and lamina propria thickness, vibrational frequency and VF displacement along the vertical component of the mucosal wave during native phonation. Measured vibrational frequencies were compared with frequency estimated by stroboscopy.

Results: Twenty-one patients underwent laryngeal OCT imaging. Mean epithelium and lamina propria thicknesses were 220 μm (±80 μm) and 860 μm (±260 μm) respectively. Mean male and female measured vibrational frequencies were 128 Hz (p=0.03) and 273 Hz (p=0.08); male vibrational frequencies were noted to be significantly correlated with measured stroboscopy frequency. Average vertical displacement of the VF during phonation was 1.86 mm.

Conclusions: VCSEL OCT is a novel, in vivo diagnostic imaging modality which allows for objective analysis of VF substructure, surface displacement within the vertical mucosal wave and vibrational frequency. OCT has an immense potential to aid Otolaryngologists in visualizing the subepithelial VF architecture while providing comprehensive kinematic analysis of VF vibration. Future OCT studies may be directed at evaluating functional VF properties in benign and malignant morphologic disease processes of the larynx.
Introduction: The laryngeal adductor reflex (LAR) is an essential tracheobronchial protective mechanism resulting in vocal fold adduction to laryngeal stimulation. It was thought to consist of an early ipsilateral R1 component and a later, bilateral but highly centrally modulated R2 component. We recently demonstrated that bilateral R1 responses are robustly present in humans under general anesthesia. We herein give evidence that the R1 response is also bilateral in awake humans and is likely the primary component responsible for initiating the LAR.

Method: Prospective series of 7 volunteers (3 males, 4 females). The reflex was initiated by direct percutaneous monopolar needle stimulation of the internal superior laryngeal nerve. Electromyographic traces from bilateral lateral cricoarytenoid muscles were recorded using hookwire electrodes. Reflex responses to variations in stimulus intensity and duration were evaluated.

Results: Bilateral R1 responses were recorded in all patients, even during deep inspiration when the vocal folds were maximally abducted. R1, but not R2, responses increased linearly in amplitude with sequential increases in both stimulation intensity (1mA to 8mA) and duration (100-500µsec) (Pearson correlation 0.94).

Conclusions: Contradicting over forty years of research, we demonstrate that the R1 LAR component is consistently bilateral in awake humans. It increases linearly with stimulus intensity and is unaffected by conscious state suggesting minimal central control. These findings may provide a means to objectively risk stratify patients for risk of laryngeal aspiration, even in unconscious states, and its potentially cardinal role in disease states such as laryngospasm and sudden infant death needs to be reevaluated.
Introduction: The larynx is a highly responsive sensory organ that is subject to mechanical, thermal, and chemical stimuli. Chemosensory cells, including taste cells that make up taste buds, detect chemical stimuli and elicit sensory responses that likely vary based on location. These cells have been identified in the larynx of humans and animals and are believed to elicit cough, swallow, and apnea when stimulated by sour, bitter, and sweet chemicals. Solitary chemosensory cells (SCC) are chemical detectors that have been identified in the murine trachea, but little is known about their presence in laryngeal tissue. In the nasal cavity of mice, SCCs induce neurogenic inflammation when stimulated by irritants. As a first step toward developing a laryngeal model of neurogenic inflammation, we sought to map the distribution, density, and types of chemosensory cells and nociceptive polymodal nerve fibers in laryngeal epithelium.

Methods: Using immunohistochemistry, we identified taste cells and polymodal nociceptive nerve fibers in the arytenoid area of the laryngeal epithelium of 20 infants undergoing supraglottoplasty for airway obstruction and/or laryngomalacia. We then compared these findings to mouse.

Results: Arytenoid tissue from both human and mouse contained numerous taste buds comprising primarily Type II (bitter, sweet, umami-sensing) taste cells with few Type III (sour-sensing) cells present. The tissue was also densely innervated in both species.

Conclusions: Our findings suggest that human and mouse larynges are biologically similar from a chemosensation standpoint. This suggests that a murine model could be used in laryngeal chemosensory research going forward.
A Novel Means of Evaluating Laryngeal Myoelectric Activity Through High Density Surface Electromyography: An Intuitive Visualization Method of Laryngeal Muscle Activity

David Bracken, MD*
Philip Weissbrod, MD*
Todd Coleman, PhD*
Gladys Omelas, BS*

San Diego, CA

Laryngeal muscle activation is a complex dynamic process. Currently, surface or needle electromyography is used for evaluation of laryngeal motor unit activity. Practical limitations exist for needle electromyography including patient discomfort, technical complexity, and short duration of task. Surface electromyography (sEMG), although non-invasive, demonstrates loss of spatial selectivity and challenges associated with electrical noise. This study presents a novel use of high-density sEMG arrays and signal analysis techniques. A 16-channel electrode grid was developed to allow for acquisition of spatially and temporally associated sEMG data. Ten subjects were recruited to perform phonatory and swallowing tasks with the array in place. EMG data was recorded and processed into a two-dimensional coronally oriented heat map to correlate with anatomic position of extrinsic laryngeal musculature. With this method, we were able to accurately delineate cricothyroid and strap muscle location and degree of activity. This pilot study suggests that noninvasive high-density sEMG has a compelling potential in diagnosis and therapeutic monitoring for voice and swallow applications.
**Permeability and Weibel-Palade Bodies of the Blood Vessels in the Human Vocal Fold Mucosa**

Kiminori Sato, MD, PhD  
Shun-ichi Chitose, MD*  
Kiminobu Sato, MD*  
Fumihiko Sato, MD*  
Hirohito Umeno, MD*  

*Kurume-shi, Fukuoka, JAPAN*

**Introduction:** Transendothelial exchange and permeability of the capillaries in the superficial layer of the lamina propria (Reinke’s space) of the vocal fold mucosa affect physiological and pathological conditions of the human vocal fold mucosa. The mechanism of permeability and Weibel-Palade bodies of the blood vessels in the human vocal fold mucosa were investigated using electron microscopy.

**Method:** Six normal human vocal folds (three adults and three newborns) obtained from autopsy cases and three human vocal folds with Reike’s edema from surgical specimens were investigated under transmission electron microscopy. Thin sections were stained with uranyl acetate and lead citrate.

**Results:** There were three possible capillary wall transport systems related to the permeability of the blood vessels in the vocal fold mucosa: 1. Fenestra transport-plasma exuded from the capillaries into surrounding tissue via the fenestrae with or without a diaphragm. 2. Vesicular transport (transcellular transport via vesicles)-the use of vesicles to ferry fluid and solutes across endothelial cells. 3. Junctional transport (intercellular transport)-molecules passed through intercellular gaps between endothelial cells. Weibel-Palade bodies were present in the cytoplasm of endothelial cells both in adults and newborns. They were present in high numbers in the cytoplasm of endothelial cells with intercellular transport in the vocal folds with Reike’s edema.

**Conclusion:** There were three types of mechanisms for the permeability of the blood vessels in the human vocal fold mucosa. Some physiologically active substances such as histamine produced by Weibel-Palade bodies may adversely influence the permeability of the blood vessels.

**Discussion**
11:00 AM  PANEL DISCUSSION
Innovation in Laryngology: Update, Challenges and Future Directions
Moderator:  Mark Courey, MD, New York, NY
Topics/Panelists:
“Advanced therapies and tissue engineering approaches in Laryngology”
  Martin Birchall, MD*, London, ENGLAND
“Cause and effect in voice production”
  Zhaoyan Zhang, PhD*, Los Angeles, CA
“Bridging the gap between discovery and cure in idiopathic subglottic stenosis”
  Alexander Gelbard, MD, Nashville, TN
“Objectively measuring oropharyngeal swallow function”
  Timothy McCullough, MD*, Madison, WI
<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:50 AM</td>
<td>Announcement: ALA Research Grants</td>
</tr>
<tr>
<td></td>
<td>Dinesh Chhetri, MD, <em>Los Angeles, CA</em></td>
</tr>
<tr>
<td></td>
<td>Announcement: ALA Poster Awards</td>
</tr>
<tr>
<td></td>
<td>Randal Paniello, MD, PhD, <em>St. Louis, MO</em></td>
</tr>
<tr>
<td>11:55 AM</td>
<td>Introduction of the 2019 ALA President</td>
</tr>
<tr>
<td>12:00 PM</td>
<td>Adjournment</td>
</tr>
<tr>
<td>12:05 PM</td>
<td>Group Photo (Members Only)</td>
</tr>
<tr>
<td></td>
<td>Location: <em>Maryland Ballroom Foyer</em></td>
</tr>
</tbody>
</table>
1:00 PM  DANIEL C. BAKER JR. MD LECTURE
Topic:   Truth, Heresy, and Paradigm Shifts
         Gayle Woodson, MD
         *Merritt Island, FL*

         **Introduction:**  Marshall E. Smith, MD, *Salt Lake City, UT*

         **ABEA Scientific Session**
         1:30 - 2:02 PM
Anesthesia and Ventilation Options for Flex Robotic Assisted Laryngopharyngeal Surgery
Yosef Krespi, MD*
Robert Koom, MD*
Victor Kizhner, MD*
New York, NY

Background: During laryngopharyngeal surgery an endotracheal tube is often placed to ensure safe anesthesia. This may interfere with surgery by impeding vision and/or distorting soft tissue. Conversely the absence of a secured airway introduces risk. The Flex Robotic System (FRS) with 3D camera and instrumentation provides ideal operating conditions combined with safe airway management. We present our experience utilizing the FRS in the shared airway setting.

Methods: Case series describing over 50 patients with laryngopharyngeal conditions treated with FRS over the course of two years.

Results: We describe various intubation options including oral intubation, nasal intubation and the innovative jet ventilation while performing effective FRS surgery. In the case of jet ventilation, a jet needle was placed through a modified instrument port allowing unobstructed ventilation. An algorithm was developed for selecting the ideal ventilation mode for different airway procedures, with specific guidelines described depending on surgical target: a) no tube or jet ventilation (10% of patients), b) nasal (70%) or c) oral intubation (20%).

Conclusions: Lesions of the tongue base, hypopharynx, larynx and trachea have the possibility to be managed transorally utilizing an innovative robotic high definition camera with various ventilation techniques. This ultimately allows the surgeon and anesthesiologist to perform surgery and monitor the critical airway simultaneously. Future additions of a third instrument port would allow ability to jet ventilate and perform these procedures bimanually with high precision.
Introduction: Despite being one of the most commonly performed procedures, there are currently no established recommendations for the use of perioperative antibiotics (PA) to prevent surgical site infections (SSI) for direct microlaryngoscopy (DML). This study examined the incidence of SSI in patients undergoing DML with and without PA.

Methods: A retrospective, multi-institutional chart review was performed at four tertiary referral academic medical centers. Patients undergoing DML from 2010-2017 were identified using CPT codes. Medical records of patients undergoing DML with biopsy, microsurgery, laser ablation or vocal fold injection were reviewed. Procedures with significant cartilage destruction, concurrent open surgery, or esophageal surgery were excluded. Patients with no follow-up were excluded. Data recorded included age, gender, pacemaker history, ASA class, wound class, indication for surgery, use of laser, complications, ER visits, hospitalization, pain, fever, and postoperative steroid and antibiotic prescriptions. Presence and absence of SSI was recorded.

Results: 725 patients met inclusion criteria. 617 did not receive PA and 108 received PA. Patients on average were 56 years of age and all cases were recorded as wound class II. 59% of surgeries involved use of carbon dioxide or KTP laser. 0.7% of patients reported post-operative fevers; all of these individuals received PA. There were no SSIs in either patient group.

Conclusions: Given the absence of SSIs in this large retrospective study, PA are not warranted during DML.
Introduction: Posterior Glottic Stenosis (PGS) results in severe derangement of laryngeal configuration and function with significant morbidity as a sequela. Presently there is no treatment for patients with “early” PGS. Dilation is often used for stenotic disease but present dilation methods are limited to a round shape and the glottis is a sector (inverted ice cream cone). Round dilation of the larynx results in compression of the membranous vocal folds (with potential for injury) and minimal expansion of the posterior larynx. We present a novel laryngeal dilation method that matches the unique anatomic shape of the glottis.

Methods: We present a clinical series of early PGS patients treated with a unique laryngeal dilation method. Five patients with dyspnea and significantly reduced vocal fold mobility due to early PGS were treated with a dilation method that involves placement of a triangular static stent in the anterior glottis with simultaneous use of a round balloon dilator in the posterior glottis.

Results: All patients reported improved ease of breathing, a decrease in their dyspnea index score and were decannualated following treatment. Video perceptual analysis of pre/post-laryngoscopy examinations was performed with five blinded reviewers and all patients were scored to have improved posterior glottic airway space following treatment with a mean improvement of 2.4 on a 5-point scale.

Table 3: Pulmonary Function Results (Patient C)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Pre-op</th>
<th>Post-op</th>
</tr>
</thead>
<tbody>
<tr>
<td>FVC (L)</td>
<td>2.10</td>
<td>3.43</td>
</tr>
<tr>
<td>FEV1 (L)</td>
<td>1.29</td>
<td>2.53</td>
</tr>
<tr>
<td>FEV1 / FVC</td>
<td>0.61</td>
<td>0.74</td>
</tr>
<tr>
<td>FEF25-75% (L/s)</td>
<td>1.12</td>
<td>2.21</td>
</tr>
<tr>
<td>PEFR (L/s)</td>
<td>1.27</td>
<td>3.39</td>
</tr>
<tr>
<td>Vext (%)</td>
<td>1.73</td>
<td>3.24</td>
</tr>
</tbody>
</table>

Conclusion: These clinical results demonstrate that there is enormous potential for the identification and treatment of patients with early PGS and the use of a laryngeal dilation technique that matches the anatomic configuration of the glottis.
Introduction: While the neuromuscular forces responsible for vocal fold motion have been studied extensively, the joint upon which they act continues to receive relatively little attention. An improved understanding of CAJ anatomy with an emphasis on surgical access might broaden clinical applications beyond steroid injection for arthritis. This anatomic study considers the feasibility of a posterior endoscopic approach to the CAJ by describing relationships between readily identifiable anatomic landmarks and the posterior CAJ space in cadaver larynges.

Methods: 6 adult cadaver larynges (2 male, 4 female) were studied. Digital calipers were used for measurements and Image J software was used for angle calculations. All cricoarytenoid joints were injected with colored-gel via a posterior approach using a 25-gauge needle.

Results: The average age of the larynges studied was 78.7 ± 10 years. The average posterior CAJ space (pCAJs) length measured 4.95 ± 0.9 mm. The average distance from the superior aspect of the midline cricoid lamina (MCL) to the center of pCAJs and the corniculate cartilage (CC) to the center of the pCAJs were 8.35 ± 1.5 mm and 14.54 ± 1.9 mm, respectively. The average pCAJs angle of declination (AD) from the horizontal plane was 54 ± 6.2 degrees. All 12 cricoarytenoid joints were successfully injected with colored-gel via a posterior approach.

Conclusions: The posterior CAJ space can be located surgically using readily identifiable anatomic landmarks. An understanding of this posterior CAJ anatomy may allow for more consistent intra-articular injection and support the development of other CAJ procedures for a range of disorders of vocal fold motion or malposition.
Introduction: Many surgical methods have been described for treatment of glottic web with very little experience on each. Butterfly mucosal flap technique utilizes superior and inferior mucosal flaps on corresponding surfaces of the web; superior flap is elevated with its base on one vocal fold and inferior flap is elevated with its base on the other vocal fold. These flaps are sutured to the vocal fold where flap’s base is located. This requires 4-6 microsutures. The disadvantage of this technique is its difficulty. Its advantages are single stage, endoscopic, outpatient surgery and high success rate.

Methods: This is an individual prospective cohort study. All consecutive 12 cases of glottic web were treated with butterfly mucosal flap technique and followed for at least 1 year postoperatively. Voice Handicap Index (VHI-30) including physical, functional, emotional and total scores, acoustic analysis with /a/, aerodynamic measures and respiratory function tests with a spirometer were determined pre- and postoperatively.

Results: Six patients were male, 5 were female and one was male-to-female transsexual. Their ages ranged between 9 and 60 with a median of 32. Eleven webs were caused by surgical trauma and one was congenital. All webs were cured with one surgery. The postoperative VHI scores, acoustic analysis results, aerodynamic measures and respiratory function test results of patients improved significantly postoperatively (p<0.05).

Conclusion: Although technically difficult, butterfly mucosal flap technique is a very successful single stage, endoscopic surgical option for treatment of glottic webs.
ABEA Scientific Session
3:15 PM – 4:00 PM
4:00 PM  ALA/ABEA Panel Discussion:
“R.I.P. RRP: What lies ahead for advanced RRP”
Moderator:    C. Gaelyn Garrett, MD, MMHC, Nashville, TN
Topics/Panelists:
“Overview of clinical issues and challenges”
C. Gaelyn Garrett, MD, MMHC, Nashville, TN
“Clinical Update: current management of tracheal and pulmonary RRP”
Craig Derkay, MD*, Norfolk, VA
“When RRP turns ugly: insights from pathology to manage advanced/aggressive RRP”
Richard Schlegel, MD, PhD*, Washington, DC
“Basic science update and Future Directions for Clinical trials”
Clint Allen, MD, Bethesda, MD

5:00 PM  Adjournment