

**THE PROGRAM
OF
THE NINETY THIRD ANNUAL MEETING
OF**



**The American
Broncho-Esophagological
Association**

Wednesday and Thursday
April 10-11, 2013

JW Marriott Grande Lakes
Orlando, Florida

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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.
- 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.
- Advanced knowledge and techniques enabling participants to compare and refine their medical and surgical skills to include best practice performance and optimize patient outcomes, as well as, introduce them to deficits in current knowledge and future research needs.

Disclosure

In compliance with 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.

Accreditation Statement

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education through the joint sponsorship of the American College of Surgeons and the American Broncho-Esophagological Association. The American College Surgeons is accredited by the ACCME to provide continuing medical education for physicians.

AMA PRA Category 1 Credits™

The American College of Surgeons designates this live activity for a maximum of 6.75 *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.



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1974 Howard A. Andersen, MD

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1982 Bernard R. Marsh, MD

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1984 Frank N. Ritter, MD

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1986 David R. Sanderson, MD

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1990 Gerald B. Healy, MD

1991 Charles W. Cummings, MD

1992 Lauren D. Holinger, MD

1993 Haskins K. Kashima, MD

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1996 Stanley M. Shapshay, MD

1997 Rodney P. Lusk, MD

1998 W. Frederick McGuirt, Sr., MD

1999 Paul A. Levine, MD

2000 Ellen M. Friedman, MD

2001 Robin T. Cotton, MD

2002 Peak Woo, MD

2003 Charles N. Ford, MD

2004 Steven M. Zeitels, MD

2005 Jonathan E. Aviv, MD

2006 Gady Har-El, MD

2007 Clarence T. Sasaki, MD

2008 Jamie A. Koufman, MD

2009 Andrew Blitzer, MD, DDS

2010 Michael Rothschild, MD

2011 Gregory Postma, MD

2012 Peter J. Koltai, MD, FACS

President's Circle

The ABEA is fortunate to count among its leadership those who have supported our science through the creation of the President's Circle and Leadership Funds.

Here, we recognize those whose gifts will ensure the ABEA's preeminent representation of advances in the science of laryngology and broncho-esophagology.

For further information on how you can also make a difference, please contact Michael Benninger, MD, at benninm@ccf.org

List of Contributors:

PRESIDENTS CIRCLE:

Jonathan Aviv, Andrew Blitzer, Gady Har-El, Peter Koltai, Jamie Koufman, Clarence Sasaki, Peter Sasaki, Peak Woo, Eiji Yanagisawa, Steven Zeitels

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Gregory Postma, MD

Wednesday, April 10, 2013

Agenda At A Glance

12:15pm	ABEA Business Meeting (Members Only)
1:00-1:03pm	Presidential Welcome Presidential Citations and Moment of Silence
1:03-1:15pm	Introduction of Guests of Honor
1:15-1:35pm	Presidential Keynote Address
1:35-2:20pm	Panel I: Button Battery Injuries
2:20 -3:02pm	Session I: Voice
2:55-3:02pm	Discussion
3:02-3:30pm	Session II: LPRD
3:23-3:30pm	Discussion
3:30-3:40pm	Break with Exhibitors
3:40-4:08pm	Session III: Pediatrics
4:01-4:08pm	Discussion
4:08-4:48pm	Session IV: Airway
4:48-4:50pm	Discussion
4:50-5:00pm	Session V: Foreign Body Management
5:00pm	Adjourn
5:15pm	Annual Photograph of ABEA Members

1:00-1:03 PM WEDNESDAY, APRIL 10, 2013

Presidential Welcome

Peter J. Koltai, MD, FACS

Stanford, CA

1:00-1:03 PM WEDNESDAY, APRIL 10, 2013

Presidential Citations and Moment of Silence

John Ausband, MD

Past ABEA President, 1971

1:03-1:15 PM WEDNESDAY, APRIL 10, 2013

Introduction of Guests of Honor

Byron J. Bailey, MD

Steven M. Parnes, MD

Jerry C. Goldstein, MD

Leora Loy

Guests Of Honor 1951–2013

-
- 1951** Fernand Eeman, MD – Ghent, Belgium
-
- 1959** Louis Clerf, MD – Saint Petersburg, FL
-
- 1961** W. Likely Simpson, MD – Memphis, TN
-
- 1962** Edwin N. Broyles, MD – Baltimore, MD
-
- 1963** Sam E. Roberts, MD – Kansas City, MO
-
- 1964** Lyman Richards, MD – Wellesley Hills, MA
-
- 1965** Berling K. Hart, MD – Charlotte, NC
-
- 1966** Julius W. McCall, MD – Cleveland, OH
-
- 1967** Francis W. Davidson, MD – Danville, PA
-
- 1968** Dean M. Lierle, MD – Iowa City, IA
-
- 1969** Leroy A. Schall, MD – Barnstable, MA
-
- 1970** Herman J. Moersch, MD – Rochester, MD
-
- 1971** Louis Clerf, MD – Saint Petersburg, FL
-
- 1972** Joseph P. Atkins, MD – Philadelphia, PA
-
- 1973** Ricardo T. Acuna – Mexico City, Mexico
-
- 1974** Paul H. Holinger, MD – Chicago, IL
-
- 1975** Arthur M. Olsen, MD – Rochester, MN
-
- 1976** Francis LeJeune, MD – New Orleans, LA
-
- 1977** Alden H. Miller, MD – Los Angeles, CA
-
- 1978** Charles Norris, MD – Philadelphia, PA
-
- 1979** Charles F. Ferguson, MD – Osterville, OH
-
- 1980** Emily Lois Van Loon, MD – Philadelphia, PA
-
- 1981** Donald Proctor, MD – Baltimore, MD
-
- 1982** Frank D. Lathrop, MD – Pittsford, VT
-
- 1983** John E. Bordley, MD – Baltimore, MD
-
- 1984** Gabriel F. Tucker, MD – Chicago, IL
-
- 1985** Stanton A. Friedburg, MD – Chicago, IL
-
- 1986** F. Johnson Putney, MD – Charleston, SC
-
- 1987** Howard A. Anderson, MD – Rochester, MN
-
- 1988** John Paul Frazer, MD – Rochester, MN

1989 Paul H. Ward, MD – Los Angeles, CA

1990 D. Thane R. Cody, MD – Jacksonville, FL

1991 M. Stuart Strong, MD – Boston, MA

1992 Bruce Benjamin, MD – Sydney, Australia

1993 David R. Sanderson, MD – Scottsdale, AZ

1994 Michael E. Johns, MD – Baltimore, MD

1995 John A. Kirchner, MD – Woodbridge, CT

1996 Robert W. Cantrell, MD – Charlottesville, VA

1997 Eiji Yanagisawa, MD – New Haven, CT

1998 Lauren Holinger, MD – Chicago, IL

1999 William R. Hudson, MD – Durham, NC

2000 Robert H. Ossoff, DMD, MD – Nashville, TN

2001 Trevor J. I. McGill, MD - Boston, MA

2002 Flavio Aprigliano, MD – Rio de Janeiro, Brazil

2003 Stanley M. Shapshay, MD – Boston, MA

2004 Minoru Hirano, M.D. – Kurume, Japan

2005 R. Rox Anderson, MD – Boston, MA

2006 Hugh F. Biller, MD – Maine

2007 Frank W. Lucente, MD – Brooklyn, NY

2008 Marvin P. Fried, MD – Bronx,

2008 Marshall Strome, MD – Cleveland, OH

2009 James Pepa – Newark, NJ

2010 William Lawson, MD, DDS – New York, NY

2011 Robin Cotton, MD – Philadelphia, PA

2012 Kiminori Sato, MD, PhD – Kurume, Japan

2013 Byron J. Bailey, MD – Galveston, TX

2013 Steven M. Parnes, MD – Albany, NY

2013 Jerry C. Goldstein, MD – Wellington, FL

2013 Leora Loy – Salt Lake City, UT

1:15-1:35PM

WEDNESDAY, APRIL 10, 2013

Presidential Keynote Address

Topic: Button Battery Injuries

Speaker: James Reilly, MD

1:35-2:20 PM WEDNESDAY, APRIL 10, 2013

PANEL I:

Button Battery Injuries

Moderator: Ian Jacobs, MD

Panel: Kris Jatana, MD
Toby Litovitz, MD
Gene Rider
Michael Babiak

2:20-3:02PM WEDNESDAY, APRIL 10, 2013

SESSION I:

Voice

Moderators: Michael M. Johns, MD
Mark Remacle, MD

2:20-2:27PM WEDNESDAY, APRIL 10, 2013

EFFECT ON LARYNGEAL ADDUCTOR FUNCTION OF SINGLE-DOSE VINCRIStINE INJECTED INTO THE POSTERIOR CRICOARYTENOID MUSCLE THREE TO FIVE MONTHS AFTER RECURRENT LARYNGEAL NERVE INJURY

Randal Paniello, MD, Presenter

ST. LOUIS, MO

Objectives: It has been shown, in a canine model, that a single dose of vincristine, injected into the posterior cricoarytenoid (PCA) muscle at the time of recurrent laryngeal nerve (RLN) injury effectively blocks its reinnervation and results in improved adductor strength. But clinically, such injuries are usually diagnosed weeks or months after onset. Vincristine injection does not affect a muscle that is already innervated; thus, there is a limited time frame following RLN injury during which a vincristine injection could effectively improve functional laryngeal adductor recovery. Delayed injections, simulating the possible clinical application of this approach, were performed and assessed in an animal model.

Design and Methods: Using a well-established canine model, the RLN was transected and repaired, and vincristine (0.4 mg) was injected into the PCA muscle at the time of injury (n=12) and at three, four, and five months later (n=8 each study group). Six months after RLN injury, laryngeal adductor function was measured. Results of vincristine injection without RLN injury (n=6) and longer-term (12 months) controls (n=4) are also reported.

Results: The animals injected at time zero had better adductor function than non-injected controls, as reported previously, and this result was maintained at 12 months. The three-month delay gave results similar to the time zero group. The five-month delay group showed no vincristine benefit, and the four-month delay group gave an intermediate result.

Conclusions: Vincristine injection of the PCA muscle after RLN injury, which blocks this antagonist muscle from synkinetic reinnervation, leads to improved laryngeal adductor functional recovery. The window of opportunity to apply this treatment appears closed about four months after RLN injury in the canine model. Human RLN recovery follows a similar time course and can reasonably be expected to have a similar therapeutic window.

2:27-2:34 PM WEDNESDAY, APRIL 10, 2013

DIFFERENCES IN LARYNGEAL NEUROTROPHIC FACTOR GENE EXPRESSION AFTER RECURRENT LARYNGEAL NERVE (RLN) AND VAGUS NERVE (VN) INJURIES

Stacey Halum, MD, Presenter

Khadijeh Bijangi-Vishehsaraei, MD, Co-Presenter

M. Reza Saadatzadeh, MD, Co-Presenter

Bryan McRae, MD, Co-Presenter

INDIANAPOLIS, IN

Purpose: Recurrent laryngeal nerve (RLN) and vagus nerve (VN) injuries characteristically are followed by differing degrees of spontaneous reinnervation, yet laryngeal muscle neurotrophic factor (NF) expression profiles after RLN and VN injuries have not been well elucidated. The goal of this study was to determine the relative changes in gene expression of five well characterized NFs from laryngeal muscle after RLN or VN injuries in a time dependent fashion, and to demonstrate how these changes correspond with electromyography (EMG)-assessed spontaneous reinnervation.

Design and Methods: The study was a basic science experiment using a rat model. Forty-eight male rats underwent left recurrent laryngeal nerve (RLN) transection (n=16), left vagus nerve transection (n=16), or a sham procedure (n=16). Primary outcomes included EMG assessment and laryngeal muscle NF expression quantification with RT-PCR at three days and at one month.

Results: EMG at three days demonstrated electrical silence in the VN injury group, normal activity in the sham group, and nascent units with decreased recruitment in the RLN injury group. EMG findings at one month were similar to those at three days, although the RLN injury group demonstrated increased recruitment and larger motor unit potentials. RT-PCR demonstrated that changes in NF gene expression from laryngeal muscles varied depending on the type of nerve injury (RLN or VN) and the specific laryngeal muscle (PCA or adductor) assessed.

Conclusions: Laryngeal muscle NF expression profiles after cranial nerve X injury depend both on the level of nerve injury and the muscles involved

2:34-2:41 PM WEDNESDAY, APRIL 10, 2013

COMPLICATIONS AND FAILURES OF OFFICE-BASED ENDOSCOPIC ANGIOLYTIC LASER TREATMENT

Anthony Del Signore, MD, Presenter

Rupali Shah, MD, Co-Presenter

Nikita Gupta, MD, Co-Presenter

Kenneth Altman, MD, Co-Presenter

Peak Woo, MD, Co-Presenter

NEW YORK, NY

Purpose: Although office-based laser applications for benign and pre-malignant lesions of the larynx are appealing, there is scant data on the encountered complications and failures. We reviewed the complications and failures of office-based angiolytic lasers including the potassium titanyl phosphate (KTP) and pulsed dye lasers (PDL) in patients with laryngeal pathology.

Design: Retrospective chart review.

Methods: One hundred ninety-one patients who underwent in-office angiolytic laser treatment in the last four years were reviewed. Documentation of laryngeal pathology, laser energy delivered, subsequent surgical intervention, complications, and failures were noted.

Results: The majority of patients had unilateral disease, which included polyps (49%), leukoplakia (14%), papilloma (12%), varix (12%), scar (10%), and polypoid chorditis (3%). There were 270 laser treatments documented, with 67% treated with the KTP laser. Average energy delivery was lesion specific, determinant on size and pathology. Papilloma received the most energy (mean 182 J) while varices received the least (mean 51 J). Most in-office treatments were well-tolerated, and 6% of patients suffered complications including scar formation, stiffness, micro-web, atrophy, and prolonged hyperemia. Twenty percent of patients received multiple treatment sessions, with 12% requiring surgical intervention for recurrence or inadequate resolution of lesions.

Conclusions: Over-treatment and under-treatment using visual feedback are present in 6% of patients. Standardized laser energy parameters based on lesion pathology and size may help to decrease complication and failure rates. Addressing problems including line of sight and further development of endoscopic laser application may help to achieve better treatment outcomes.

2:41-2:48 PM WEDNESDAY, APRIL 10, 2013

ACCURACY OF REFERRAL DIAGNOSIS: A LARYNGOLOGICAL PERSPECTIVE

Nancy Solowski, MD, Presenter

Gregory Postma, MD, Co-Presenter

Paul Weinberger, MD, MD, Co-Presenter

AUGUSTA, GA

Michele Morrison, MD, Co-Presenter

PORTSMOUTH, VA

Ashli O'Rourke, MD, Co-Presenter

CHARLESTON, SC

Neil Chheda, MD, Co-Presenter

GAINESVILLE, FL

Creighton Vaught, MD, Co-Presenter

BURLINGTON, NC

Milan Amin, MD, Co-Presenter

Lucian Sulica, MD, Co-Presenter

NEW YORK, NY

C. Blake Simpson, MD, Co-Presenter

HOUSTON, TX

Purpose: This project compared accuracy of primary referring diagnosis with final diagnosis in patients with laryngologic complaints following evaluation in tertiary laryngology practices. The diagnostic accuracy of patients with laryngologic complaints and the key diagnostic instruments have not been adequately studied.

Design: Prospective, multi-institutional study involving five tertiary laryngology practices of consecutive new patients referred with a diagnosis for evaluation. Patient demographics, referral and final diagnoses, and key diagnostic tests were recorded.

Methods: Referring diagnosis was compared to final diagnosis and dichotomized as agreement versus non-agreement. Contingency table analysis with two-tailed Fisher's exact test was used to compare referring and final diagnosis. Bonferroni correction was applied.

Results: One thousand patients met the study's criteria. The overall diagnosis agreement rate was 67%. The most common referring diagnoses were vocal fold polyp or nodule (VFP/N) (131 patients, 13%), unilateral vocal fold paralysis (UVFP) (129, 12.8%), and laryngopharyngeal reflux (LPR) (126, 12.5%). Referring diagnoses more likely to be in agreement with final diagnosis were UVFP (89.9% agreement, corrected $p < 0.001$), vocal fold granuloma (90.0%, $p = 0.05$), and recurrent respiratory papillomatosis, (95.5%, $p = 0.02$). Referring diagnoses more likely to be in disagreement were VFP/N (45.8% non-agreement, $p = 0.01$), LPR (60.3%, $p < 0.001$), and dystonia (58.5%, $p < 0.001$). Stroboscopy was the most frequent key diagnostic tool used to make the final diagnosis.

Conclusions: VFP/N, dystonia, and LPR appeared to be the most difficult diagnoses to correctly identify by referring physicians. UVF paralysis was highly likely to be correctly diagnosed. Our data suggest that patients with suspected clinical diagnoses of VFP/N, dystonia, or LPR may benefit from subspecialist evaluation.

WEDNESDAY, APRIL 10, 2013

Steven D. Gray Resident 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

2:48-2:55 PM WEDNESDAY, APRIL 10, 2013

STEVEN D. GRAY RESIDENT AWARD

Recipient: Mitsuyoshi Imaizumi, MD

THE POTENTIAL OF EPITHELIAL DIFFERENTIATION FROM HUMAN-INDUCED PLURIPOTENT STEM CELLS (iPSCs) FOR VOCAL FOLDS TISSUE ENGINEERING

Mitsuyoshi Imaizumi, MD, Presenter

Yuka Sato, MD, Co-Presenter

Susan Thibeault, MD, Co-Presenter

MADISON, WI

Objectives: Vocal fold scarring remains a clinical challenge. One potential treatment option for severe vocal fold scarring is to regenerate the vocal fold with a tissue-engineered scaffold containing induced pluripotent stem cells (iPSCs) derived cells. As a first step toward that goal, we aimed to develop epithelium differentiation models and examined the possibility of iPSCs for the regeneration of the vocal folds.

Methods: We developed two separate differentiation models to examine epithelium differentiation in vitro. Human iPSCs were cultured in hyaluronic acid (HA)-hydrogel as a three-dimensional (3D) scaffold. iPSCs-hydrogel constructs were treated with EGF (epidermal growth factor) and co-cultured with vocal fold fibroblasts (VFFs). After one, two, and four weeks after treatment, iPSCs were selected for histologic and immunohistochemical examination.

Results: iPSCs cultivated with VFFs after four weeks showed histologic evidence of epithelium differentiation. The expression of cytokeratins (CK), vocal folds epithelium associated proteins, were detected at four weeks after cultivation in iPSCs cultured with EGF and in iPSCs cultured with VFFs. In contrast, iPSCs cultured without growth factors showed no expression. The expression of SSEA-1, a marker for monitoring transition of undifferentiated stem cells to a differentiated state, was detected

at four weeks cultivation in iPSCs cultured with EGF and in iPSCs cultured with VFFs.

Conclusions: iPSCs-hydrogel constructs with EGF and co-cultured with VFFs showed histologic evidence of epithelium differentiation after four weeks cultivation in vitro. Our epithelium differentiation systems demonstrated the possibility of iPSCs for the regeneration of the vocal folds.

3:02-3:30PM WEDNESDAY, APRIL 10, 2013

SESSION II:

LPRD

Moderators: Tanya K. Meyer, MD
Nayla Matar, MD

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 brohcoesophagology, laryngology or related science.

Recipients of the Broyles-Maloney Award:

1988 Richard A. Kosarek, MD	1999 Robert Berkowitz, FRACS
1989 None	Qi-Jian Sun, PhD
1990 Thomas F. Dowling, MD	John Chalmers, PhD
Jamie Koufman, MD	Paul Pilowsky, PhD
1991 None	2000 Asif Amirali, MD
1992 None	Greg Tsai, MD
1993 Jos. J.M. van Overbeek, MD, PhD	Nicole Schrader, MD
1994 Steven D. Gray, MD	Donald Weisz, PhD
1995 Jonathan E. Aviv, MD	Ira Sanders, MD
John H. Martin, PhD	2001 None
Ralph Sacco, MD	2002 Shin-ichi Kanemaru, MD
Beverly Diamond, PhD	Hisayoshi Kojima, MD
Andrew Blitzer, MD, DDS	Akhmar Magrufov, MD
1996 None	Koichi Omori, MD
1997 Ira Sanders, MD	Yasuyuki Hiratsuka, MD
Liancai Mu, PhD	Shigeru Hirano, MD
1998 Nancy M. Bauman, MD	Juichi Ito, MD
Degiang Wang, MD	Yasuhiko Shimizu, MD
Eric S. Luschei, PhD	2003 Ira Sanders, M.
Debra M. Jaffe, MD	2004 Clarence T. Sasaki, MD

2005 Tomoko Tateya, MD

Ichiro Tateya, MD, PhD*

Diane M. Bless, PhD*

2006 None

2007 J. Scott McMurray, MD

Charles N. Ford, MD

Nadine P. Conner, MD*

2008 Tina L. Samuels, MS*

Ethan Handler*, BS*

Michael L Syring, BS*

Joel H Blumin, MD

Joseph E Kershner, MD

Nikki Johnston, PhD*

2009 Nikki Johnston, PhD*

Clive W. Wells*

Tina Samuels, MS*

Joel Blumin, MD

2010 Sandeep Karajanagi, PhD*

Gerardo Lopez-Guerra, MD*

Hyoungshin Park, PhD*

James B. Kobler, PhD*

Daryush D. Mehta, SM*

Yoshihiko Kumai, MD, PhD*

James T. Heaton, PhD*

Victoria L. M. Herrera, MD*

Robert E. Hillman, PhD*

Steven M. Zeitels, MD

2011 Mikhail Wadie, MD*

2012 Satoshi Ohno, MD*

Shin-ichi Kanemaru, MD, PhD*

Masanobu Mizuta, MD*

Seiji Ishikawa, MD*

Ichiro Tateya, MD, PhD

Tatsuo Nakamura, MD, PhD*

Juichi Ito, MD, PhD*

2013 Tina Samuels, PhD

Nikki Johnston, MD

MDGary Stoner, MD

3:02-3:09PM WEDNESDAY, APRIL 10, 2013

Broyles-Maloney Award

Recipient: Tina Samuels, PhD.

PLANT-DERIVED COMPOUNDS INHIBIT PEPTIC ACTIVITY AND PEPSIN-MEDIATED STRESS AND PROLIFERATIVE CHANGES IN HUMAN AIRWAY EPITHELIAL CELLS IN VITRO

Tina Samuels, PhD, Presenter
Nikki Johnston, MD, Co-Presenter
Gary Stoner, MD, Co-Presenter
MILWAUKEE, WI

Purpose: Laryngopharygeal reflux (LPR) is associated with inflammatory and neoplastic airway disorders. Pepsin is a fundamental noxious element of reflux; airway cells internalize pepsin, which promotes oxidative stress, inflammation, and carcinogenesis. There is currently no effective non-surgical treatment for LPR; however, several plant extracts/compounds inhibit digestive enzymes and inflammatory/neoplastic changes in models of gastroesophageal reflux. This study examines the potential of chemoprotective phytochemicals to directly inhibit peptic activity and mitigate pepsin-mediated damage of human airway epithelial cells in vitro.

Design: Cultured human laryngeal and hypopharyngeal (FaDu) epithelial cells were briefly exposed to curcumin (10uM), ecabet sodium (ES; 125ug/ml), and anthocyanin-enriched black-raspberry extract (BRB; 100ug/ml) prior to treatment with pepsin (0.1mg/ml) at pH7; controls treatments were 1) pH7 media, or 2) pepsin, pH 7, without phytochemicals. Mitochondrial integrity was examined by electron microscopy and proliferative changes by cell count, flow cytometry, and qPCR array. Enzymatic inhibition was determined by in vitro kinetic assay.

Results: Micromolar concentrations of curcumin, ES, and BRB inhibited peptic activity in vitro and mitochondrial damage and hyperproliferation due to pepsin in cultured cells. Curcumin abrogated pepsin-mediated depression of tumor suppressor gene expression in FaDu cells.

Conclusions: Several phytochemicals effectively inhibit pepsin-mediated cell damage underlying inflammatory/neoplastic manifestations of LPR. Dietary supplementation or adjunctive therapy with phytochemicals may represent novel preventive or therapeutic strategies for LPR-attributed disease.

3:09-3:16 PM WEDNESDAY, APRIL 10, 2013

IMPEDANCE PROBE TESTING PRIOR TO AIRWAY RECONSTRUCTION

Catherine Hart, MD, Presenter
Alessandro de Alarcon, MD, Co-Presenter
Steven Hamilton, MD, Co-Presenter
Meredith Tabangin, MD, Co-Presenter
Michael Rutter, MD, Co-Presenter
Scott Pentiuk, MD, Co-Presenter
Jose Garza, MD, Co-Presenter

CINCINNATI, OH

Objectives: Determine if preoperative impedance probe testing changed patient management and if the testing correlated with surgical outcomes in patients undergoing open airway reconstruction.

Design and Methods: Retrospective review of all patients who had impedance probe testing done prior to airway reconstruction at a tertiary care pediatric hospital from January 2010 to September 2011. Charts were reviewed for demographics, past medical and surgical histories, impedance probe testing, and surgical outcomes.

Results: One hundred fifty patients underwent open airway reconstruction during the study period. Fifty-seven (38%) patients had impedance testing preoperatively and were included in the study. Forty-seven (82%) were premature, and seven (12%) were syndromic. Forty-seven (82%) had a primary diagnosis of subglottic stenosis. Twenty-six (45%) had a history of previous airway surgery. Thirty-six (63%) had a diagnosis of gastroesophageal reflux, and 21 (36%) had undergone a Nissen fundoplication. Patients without a fundoplication had a median 46.0 total reflux, 7.0 proximal, and 14.5 acidic events compared to a median 5.0 total reflux, 0 proximal, and 0 acidic events in patients with a fundoplication. Impedance testing changed management in 22% (8/36) of patients without a fundoplication and 9.5% (2/21) of patients with a fundoplication. Patients with a fundoplication were less likely to have successful surgery

compared to those without (33% vs. 67%, $p=0.01$).

Conclusions: Impedance testing may play a role in guiding management of gastroesophageal reflux prior to airway reconstruction in a subset of patients. Patients with a history of fundoplication were less likely to have a successful surgery, suggesting that factors other than gastroesophageal reflux influence the success of airway reconstruction.

3:16-3:23 PM WEDNESDAY, APRIL 10, 2013

EMERGING EVIDENCE FOR BICARBONATE SECRETION IN PORCINE VOCAL FOLD EPITHELIUM

Abigail Durkes, MD, Presenter

M. Preeti Sivasankar, MD, Co-Presenter

WEST LAFAYETTE, IN

Objective: A protective liquid layer maintained through active transepithelial ion transport lies between the airway lumen and vocal fold epithelium. Sodium and chloride are the major ions maintaining this layer; however, respiratory epithelia demonstrate a role for bicarbonate ion secretion as an additional contributor. Bicarbonate transport is a common physiological mechanism to maintain acid-base homeostasis. The objective of this study is to demonstrate a role for bicarbonate in maintaining vocal fold epithelial homeostasis. This research is relevant since low-pH environments in the laryngeal lumen are associated with vocal pathologies and airway disease. Bicarbonate secretion may modulate the pH gradient.

Design: In vitro design with control and challenge groups.

Methods: Ion transport was measured via electrophysiology on porcine vocal fold epithelium (n=13). Vocal fold epithelia were exposed to control or bicarbonate-free challenge on the luminal surface. Both the control and bicarbonate-free challenges were similar in osmolarity, tonicity, and pH. Twelve tissues were subsequently challenged with hydrochloric acid (pH4).

Results: Preliminary results suggest that the bicarbonate-free challenge increases ion secretion (p=0.07) and further that the magnitude of ion secretion is reduced after acid exposure. These results were not observed for vocal folds in the control group, suggesting a role for bicarbonate in vocal fold defense to acidic environments.

Conclusions: Bicarbonate transport may contribute to the homeostasis of the liquid layer on the vocal fold epithelium. The implication of bicarbonate transport in maintaining the composition of surface fluid following laryngopharyngeal reflux will be discussed.

3:40-4:08 PM WEDNESDAY, APRIL 10, 2013

SESSION III:

Pediatrics

Moderators:

Dana M. Thompson, MD

Cesare Piazza, MD

3:40-3:47PM WEDNESDAY, APRIL 10, 2013

VALIDATED SCORING SYSTEM FOR PEDIATRIC SLEEP ENDOSCOPY

Dylan Chan, MD, Presenter

David Horn, MD, Co-Presenter

Bryan Liming, MD, Co-Presenter

Sanjay Parikh, MD, Co-Presenter

SEATTLE, WA

Purpose: To design and validate a scoring system to quantify airway obstruction in pediatric drug-induced sleep endoscopy.

Design: Retrospective case series.

Methods: Flexible fiberoptic laryngoscopy was performed under propofol anesthesia in children with obstructive sleep apnea as determined by a pre-operative polysomnogram. Endoscopic exams were recorded on video and assessed by three independent raters based on the following scoring template. Five locations in the upper aerodigestive tract—adenoid, velum, lateral pharyngeal wall/tonsil, tongue base, and supraglottis—were evaluated on a four-point scale for obstruction at maximal opening and closure. Aggregate and site-specific scores were compared between raters and evaluated with respect to external measures of sleep apnea.

Results: Sleep endoscopies from 30 children (mean age=3.1 years) with obstructive sleep apnea were rated. All children underwent pre-operative polysomnography, with an average apnea-hypopnea index of 18.3. Inter-rater reliabilities for aggregate and site-specific scores were determined. These scores, as well as secondary measures from the scoring template including presence of single-level versus multilevel obstruction, exam reliability, tonsil and turbinate size, and need for adjunct airway support during the evaluation, were correlated with demographic features and multiple polysomnographic indices.

Conclusions: The proposed scoring system, which is designed to be easy to use and allow for subjectivity in evaluating obstruction at multiple levels, nonetheless achieves good inter-rater reliability and external validity. Implementing this system will allow for standardization of reporting for sleep endoscopic outcomes, as well as aid the practicing clinician in the interpretation of sleep endoscopic findings to inform site-directed surgical intervention in cases of complicated obstructive sleep apnea.

3:47-3:54PM WEDNESDAY, APRIL 10, 2013

THE 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.

THE SEYMOUR R. COHEN AWARD FOR PEDIATRIC LARYNGOLOGY AND BRONCHESOPHAGOLOGY

Recipient: Kevin Huoh, MD

AIRWAY MANAGEMENT OF CHILDREN FOLLOWING SLIDE TRACHEOPLASTY

Kevin Huoh, MD, Presenter

Peter J. Koltai, MD, FACS, Co-Presenter

STANFORD, CA

Objective: To describe our experience with postoperative airway management of children following slide tracheoplasty and to identify the risk factors that result in the subsequent need for airway intervention.

Methods: A retrospective chart review was performed for patients who underwent slide tracheoplasty for congenital complete ring tracheal stenosis at a tertiary care children's hospital between 2003 and 2012. Patient demographic data, associated cardiopulmonary conditions, preoperative airway evaluation, and postoperative airway management were reviewed and analyzed.

Results: Twenty-four patients met the study's criteria, with a median age of 218 days at surgery. There were 13 boys and 11 girls in the cohort. Adverse airway outcome was defined as prolonged postoperative intubation >six days, reintubation for airway support, necessity of dilation for restenosis, or the requirement of tracheotomy. Twenty patients were extubated in the immediate postoperative period with an average time to extubation of 5.8

days. Overall, 12/24 (50%) of patients ultimately had an adverse outcome. Five (21%) patients required tracheotomy. Patients with adverse outcomes were more likely to have had an indwelling endotracheal tube at the time of surgery (75%).

Conclusions: After slide tracheoplasty, most children can be extubated following control bronchoscopy within seven days. However, often the cardiopulmonary comorbidities of these patients or a history of preoperative intubation lead to repeat airway interventions that may ultimately require a tracheotomy for definitive airway management.

3:54-4:01PM WEDNESDAY, APRIL 10, 2013

LONG-TERM OUTCOMES OF INFANTS WHO ASPIRATE

Charles Bruer, MD, Presenter

James Sidman, MD, Co-Presenter

ST. PAUL, MN

Purpose: To evaluate the outcome of non-syndromic infants diagnosed with chronic aspiration.

Methods: Medical records of infants identified with aspiration were retrospectively reviewed to determine the progression of their chronic aspiration. Records were reviewed from initial diagnosis to the eventual resolution of their aspiration, and were based on videofluoroscopic swallow studies (VFSS). Co-morbidities were reviewed to minimize the inclusion of patients diagnosed with aspiration secondary to another diagnosis. Infants, aged birth to 6.5 months, diagnosed with primary aspiration following an initial VFSS presenting with a minimum of 30 weeks gestation at birth, no chromosomal, structural, or mechanical abnormalities (oral, tracheal, or esophageal), syndromes, or known vocal cord paralysis were eligible to be included in the study. A total of 43 patients met the inclusion criteria.

Results: Of the charts reviewed, 97.6% (42) showed resolution of the chronic aspiration within 18 months, often following standard treatment. Of those resolved cases, 65.1% (28) confirmed the absence of aspiration with a VFSS while in the remaining 32.6% (14) of the resolved cases, no follow-up VFSS was deemed necessary due to a lack of observed instances or signs of aspiration. One (2.4%) of the charts reviewed exhibited continued aspiration during all subsequent VFSS.

Conclusions: This data suggests that within 18 months following the diagnosis of unexplained chronic aspiration, with no surgical intervention, infants will exhibit normal swallowing mechanics with complete resolution of the aspiration. The reasons for this spontaneous resolution remain undetermined.

4:08 -4:48PM WEDNESDAY, APRIL 10, 2013

SESSION IV:

Airway

Moderators: Mark Courey, MD
Frederik Dikkers, MD

4:08-4:15PM WEDNESDAY, APRIL 10, 2013

TRACHEAL SIZE VARIABILITY ASSOCIATION WITH GENDER: IMPLICATIONS FOR ENDOTRACHEAL TUBE SELECTION

Arunabha Karmakar, MD, Presenter

Mariah Pate, MD, Co-Presenter

Nancy Solowski, MD, Co-Presenter

Gregory Postma, MD, Co-Presenter

Paul Weinberger, MD, Co-Presenter

AUGUSTA, GA

Purpose: While selection of endotracheal tube (ETT) size in pediatric patients has established predictive nomograms, in adults ETT sizing is relatively arbitrary. We sought to determine associations between cervical tracheal cross-sectional area (TCSA) and clinical demographic variables.

Methods: Inclusion criteria were consecutive patients undergoing non-contrasted chest CT at a single tertiary care institution from January 2010 to June 2011. Patients with improper CT technique, endotracheal intubation, and pulmonary/tracheal pathology were excluded. Tracheal luminal diameters in AP (D1) and transverse (D2) were measured 2 cm inferior to the cricoid and used to determine $TCSA=3.1416 \cdot D1 \cdot D2 \cdot 1/4$. Demographic variables of age, height, weight, and BMI were tested for association with TCSA by Spearman correlation. Wilcoxon rank-sums test was used to compare TCSA by ethnicity and gender. Multivariate linear regression was performed including all clinical variables.

Results: Ninety-one patients met the inclusion criteria. There was no correlation between age, weight, or BMI and TCSA. There was a significant positive correlation between patient height and TCSA ($p=0.001$, $R=0.345$); however, this was confounded by gender. Female patients had significantly smaller TCSA (mean 240 mm²) compared to male patients (349 mm², $p<0.001$). Multivariate linear regression stratified by gender revealed that height is correlated with TCSA only in males ($p=0.028$). Males also had more variability in TCSA (SD 118.6) compared to females (SD 65.5).

Conclusions: Our data suggest that selection of ETT size in male patients should include height as a predictive factor. For females it may be appropriate to select a uniformly smaller diameter ETT.

4:15-4:22PM WEDNESDAY, APRIL 10, 2013

AORTIC HOMOGRAFT RECONSTRUCTION OF LARYNGOTRACHEAL STENOSIS: A NEW TECHNIQUE

John Wain, MD, Presenter

Steven Zeitels, MD, Co-Presenter

BOSTON, MA

Objectives: We initially reported the successful use of cadaveric cryopreserved homograft aorta (CCHA) as a new method of laryngeal reconstruction for wide-field partial-laryngectomy defects. Similarly challenging, repairing complex laryngotracheal stenosis can be formidable due to altered anatomy from prior surgery, excessive scarring, and compromised blood supply. Comparable to our oncologic experience, we sought to overcome these difficulties by transplanting commercially available CCHA.

Methods: A retrospective case series was done in four patients with laryngotracheal stenosis who underwent wide-field resection of portions of the larynx and trachea as well as reconstruction with CCHA.

Results: All patients had a tracheotomy in the past, and all were decannulated. Three of four patients did not have significant vocal dysfunction and did not sustain significant voice deterioration. One patient was aphonic and recovered a highly serviceable voice. All resumed per-oral nutrition on the first postoperative day. There were no major complications or wound infections. No patient received pharmacological immunosuppression.

Conclusions: Transplanting human cadaver aorta provides the airway surgeon with a reliable and conceptually novel reconstructive option for patients with complex laryngotracheal stenosis. The success in this pilot series allowed for optimal voice and aerodigestive function. Using the cadaver aorta as a laryngotracheal airway substrate retains a number of advantages including 1) mechanical properties of the soft-tissue graft as a scaffold, 2) lack of graft immunogenicity, 3) practical incorporation of the aortic homograft into local soft tissues, and 4) ease of surgical handling of the graft.

4:22-4:29PM WEDNESDAY, APRIL 10, 2013

BIOMECHANICAL EFFECTS OF LONG-TERM STORAGE TECHNIQUES FOR DECELLULARIZED TRACHEAL SCAFFOLDINGS

Paul Weinberger, MD, Presenter
Matthew Jones, MD, Co-Presenter
Donald Mettenburg, Co-Presenter
Gregory Postma, MD, Co-Presenter
Frederick Rueggeberg, DDS, Co-Presenter
Jennifer Waller, MD, Co-Presenter
AUGUSTA, GA

Purpose: With tracheal transplantation emerging as a viable option for tracheal repair, allograft scaffolding availability will become increasingly important. Long-term storage techniques that preserve the original graft would help alleviate donor shortages, but effects on structural integrity are poorly understood. The purpose of this study was to determine the biomechanical changes in tracheal scaffolds resulting from decellularization processing and long-term storage at -80C.

Methods: Forty-five rabbit tracheal segments were separated into treatment groups: native/untreated (1), decellularized (2), and decellularized followed by storage at -80C (3). Tracheal segments were subjected to uniaxial tension (n=22) and compression (n=23) testing using a universal, force-tension machine to determine sutured tensile yield load and compressive strengths. Mean differences between groups for tension and compression were compared by ANOVA with post-hoc Tukey-Kramer test. Alpha was set at 0.10 as this was a pilot project.

Results: The untreated trachea (group 1) demonstrated a mean yield strength of 5.93 N and a compressive strength of 2.10 N. Following treatment and/or storage, the scaffolds' ability to retain suture was not impaired (group 2=6.79N, 3=6.21N, $p>0.10$ each). Following decellularization there was a reduction in compressive strength, but no further loss in this parameter due to storage (group 2=0.44N, 3=0.39N; $p<0.001$).

Conclusions: The scaffold's ability to hold a suture is promising. Our data suggest that long-term storage at -80C may be a viable storage method. Further research is needed to determine possible biochemical changes that may result from long-term storage at -80C.

4:29-4:36PM WEDNESDAY, APRIL 10, 2013

INFLAMMATORY PROTEIN EXPRESSION IN HUMAN SUBGLOTTIC STENOSIS TISSUE MIRRORS THAT IN A MURINE MODEL

Sunny Haft, MD, Presenter
Noam Cohen, MD, Co-Presenter
Ankona Ghosh, MD, Co-Presenter
Kevin Leahy, MD, Co-Presenter
Jennifer Lee, MD, Co-Presenter
Nora Malaisrie, MD, Co-Presenter
Natasha Mirza, MD, Co-Presenter
Genevieve Philiponis, MD, Co-Presenter
Sunil Singhal, MD, Co-Presenter
PHILADELPHIA, PA

Objectives: 1) To delineate the pathophysiology of subglottic stenosis (SGS) by measuring an array of protein expression and messenger RNA levels within human SGS tissue, and 2) to compare this human array to cytokine expression from a functional murine model of SGS in order to confirm the effective translational nature of our animal model.

Methods: Human granulation tissue from 11 patients with early, symptomatic SGS was compared to normal tracheal tissue from five patients without SGS. Tissue was homogenized, protein and RNA extracted, and expression levels of 18 different cytokines compared using a Luminex protein assay. mRNA expression of TGF β 1, IL-1 β , MMP9, SMA, SMAD2, and VEGF-A were measured using RT-PCR, and the results were compared to the gene expression profile in the murine model.

Results: The protein expression in human SGS mirrors that seen in murine SGS. TGF β 1, IL-1 β , and MMP9 were markedly elevated in both human and mouse SGS tissue, and SMA, SMAD2, and VEGF-A, while not significantly elevated, trended upward. The protein array showed statistically significant elevation in the pro-inflammatory cytokines TGF β 1, IL-1 β , GM-CSF, MIP1 β , and IFN γ .

Conclusions: This is the first study, to our knowledge, measuring an array of protein expression within human SGS tissue. The expression profile suggests that symptomatic, tracheal granulation tissue is mostly within the early inflammatory phase of wound healing and has only begun fibrotic and angiogenic remodeling. This study validates our murine model of SGS and also helps to define the exact pathways of tissue injury, leading to directed treatment methods using our murine model.

4:36-4:43PM WEDNESDAY, APRIL 10, 2013

EVALUATION OF SUBGLOTTIC STENOSIS USING FOURIER DOMAIN LONG-RANGE OPTICAL COHERENCE TOMOGRAPHY

Joe Jing, MD, Co-Presenter

Anthony Chin Loy, MD, Co-Presenter

Sunil Verma, MD, Presenter

Brian Wong, MD, Co-Presenter

IRVINE, CA

Objectives: Evaluation of subglottic stenosis may be performed with tracheobronchoscopy, computed tomography, or a combination of the two. A pilot study was performed to determine the feasibility of using Fourier Domain Long-Range Optical Coherence Tomography (LR-OCT) as an alternative method of imaging the airway before and after treatment for subglottic stenosis.

Methods: Patients undergoing microlaryngoscopy for management of subglottic stenosis were imaged with LR-OCT immediately before and after treatment. Video endoscopy was performed simultaneously to provide comparison images. The LR-OCT probe consisted of a triple-wound torque coil, which translated rotation from an externally mounted rotational motor. Circumferential axial images were obtained. Three-dimensional volumetric reconstructions were generated using Mimics software.

Results: Average image acquisition time was 20 seconds. Precise dimensions and anatomic structure of stenotic segments were obtained before and after treatment. Images provided by LR-OCT were accurate to 10 micron resolution. Three-dimensional renderings were used to perform “virtual bronchoscopy” before and after treatment.

Conclusions: This is the first study to use LR-OCT to examine the subglottic airway before and after surgical treatment in human subjects. Accurate volumetric airway reconstructions can be performed and used to precisely gauge airway geometry. As images are acquired using a simple optical fiber system, office-based imaging of the subglottis in the awake patient may be possible in the future.

4:50-5:00PM WEDNESDAY, APRIL 10, 2013

SESSION V:

Foreign Body Management

Foreign Body Management Presentation:

A FISH WAY OUT OF WATER: A CASE REPORT OF A UNIQUE AIRWAY FOREIGN BODY

Eric Gantwerker, MD, MS, Presenter

Keith Casper, MD, Co-Presenter

Steven Hamilton, MD, Co-Presenter

CINCINNATI, OH

History and Presentation: A 40-year-old male was out fishing for bluegill fish. Reportedly, the patient had attempted to bite the head off of the bluegill to use it as bait when the fish moved suddenly. This caused the patient to gasp in surprise and aspirate the fish in its entirety. The patient had some immediate coughing and choking. He was transported to a local emergency room where his oxygen saturations were in the high 90s on room air. He was given the Heimlich maneuver in an attempt to dislodge the foreign body. The patient began having hemoptysis and a chest X-ray at that time revealed pneumomediastinum. The spike-like nature of the bluegill dorsal fin in conjunction with the mediastinal air prompted a higher level of concern for potential airway compromise and complication with extraction. The patient at that time was transferred to our tertiary care facility via helicopter evacuation.

Office Procedure: Upon arrival to the trauma bay at our hospital, the patient was in no acute distress, remained on room air and was noted to have subcutaneous emphysema. The patient was prophylactically placed on oxygen via facemask and anesthetized with four percent nebulized lidocaine as well as topical lidocaine to the oropharynx.

Given the sharp nature of the fins and spikes of a blue gill fish, it was our concern that attempts at removal may cause significant tracheal injury. As such, the cardiothoracic team was consulted and accompanied the otolaryngology team to the operating room. The cardiopulmonary bypass team was made aware as well in case their services would be needed.

Upon arrival to the operating suite the patient was given a

small dose of midazolam. The patient was kept upright and a fiberoptic bronchoscope was passed transnasally to the level of the glottis. Four percent lidocaine was sprayed directly over the laryngeal introitus through the bronchoscope. The supraglottis, glottis and subglottis were normal in appearance. Immediately visible at the carina was the blue gill fish, face down and taking up the entirety of the right mainstem bronchus. The tail of the blue gill was above carina and intermittently covered over the left mainstem with inspiration. No obvious tracheal tears were noted at that point and we elected to attempt transoral retrieval. If the fish appeared lodged in the sidewall of the airway and imminent injury was suggested by attempt at removal, we would abort and retrieve either via a thoracotomy/video assisted thoroscopic (VATS) approach or initiate cardiopulmonary bypass.

The anesthesia team began to infuse ketamine, a fast acting dissociative anesthetic. The patient was kept spontaneously breathing and laid supine. With the cooperation of the patient, a dedo laryngoscope was inserted and the patient was placed in suspension. A zero-degree Hopkins rod telescope was placed through the vocal folds and the foreign body was brought into view. A large alligator forceps was utilized with two-hand technique to grasp the body of the fish. Despite multiple sharp spines, the fish dislodged quite easily without engaging the sidewall of the airway. On first attempt the fish body was too large to pass through the glottis and the tail of the fish avulsed while the remainder re-lodged in the right mainstem. An endoscopic basket was attempted to capture the fish, which was unsuccessful. The dedo laryngoscope was advanced to the glottis level and the fish was re-grasped and taken through the true vocal folds where it became temporarily lodged. It was easily removed while removing the dedo all in one.

Conclusion: A second pass with a rigid and flexible bronchoscope through the dedo laryngoscope showed no obvious tracheal tears and only minor abrasions along the sidewalls of the airway. The patient was admitted overnight to the ICU for observation and placed on antibiotics and steroids. He did quite well and was discharged the next day.

Presidential Citation for Foreign Body Management Award Winner

Presented by Graham Richter, MD

To

David Rosow, MD

OFFICE REMOVAL OF A SUBGLOTTIC BREAD CLIP

David Rosow, MD, Presenter

Si Chen, MD, Co-Presenter

MIAMI, FL

Objective: To report successful office removal of a plastic bread clip from a patient's subglottis.

History and Presentation: A 34-year-old man was referred for a laryngeal foreign body. His symptoms began 15 months prior when he felt his airway obstruct for a few seconds while eating a fish oil capsule. He developed hoarseness and a globus sensation that were treated elsewhere with proton pump inhibitors, with some voice improvement over time. The globus sensation persisted, and another otolaryngologist diagnosed him with a laryngeal foreign body, possibly a bay leaf. Office examination revealed a firm, linear foreign body vertically bisecting the subglottis approximately 5 mm below the vocal folds, wedged between the anterior and posterior walls. It was rigid, and no movement was noted with phonation or respiration. It did not affect glottic closure, and there was no stridor or airway distress. He was consented for office removal.

Office Procedure: The oropharynx and larynx were anesthetized with inhaled 4% lidocaine. A flexible distal-chip laryngoscope with working channel was used to visualize the foreign body just inferior to the glottis. An additional 2 cc of 4% lidocaine were dripped directly onto the glottis and subglottis to ensure adequate topical anesthesia. Cupped biopsy forceps were introduced through the working channel and used to grasp the foreign body, which was removed easily and atraumatically from the larynx. It appeared to be a large piece of plastic that would not fit through the nasal cavity. Thus, it was repositioned at the nasopharynx and removed transorally. Inspection revealed a 3x1.5 cm plastic clip from a loaf of bread. The clip was covered

in purulent discharge, and text on it read “Exp 5/30/11.” On further questioning, the patient admitted he might have accidentally swallowed the clip while eating a sandwich in May 2011.

Results: The patient reported immediate relief of his symptoms, and one-week follow-up confirmed complete resolution of his dysphonia and globus sensation.

Discussion: Visualization of the larynx in a living human has changed dramatically over the past 200 years, as improved illumination and the development of anesthesia have contributed to a central role of laryngoscopy in diagnosing and treating airway obstruction. Horace Green had previously described laryngeal instrumentation in the 1840s, with blind and indirect removal of foreign bodies and laryngeal lesions. Following Killian’s introduction of the rigid bronchoscope in 1897, translaryngeal removal of airway foreign bodies under direct vision became increasingly popular. Schroetter described in 1905 removal of a tack in the bronchus of an awake patient, without anesthesia, via rigid upper bronchoscopy. Flexible fiberoptic endoscope revolutionized the field in the 1970s by allowing visualization of the laryngopharynx in awake, upright patients with only local anesthesia. Choy et al. described transnasal fiberoptic endoscopy combined with orally introduced forceps for foreign body removal from the oropharynx and hypopharynx in 1992. Distal chip technology, which permits improved image resolution and the presence of an extra channel in the endoscope for integrated instrumentation, has further improved the clinician’s ability to manipulate the airway in awake patients.

Conclusions: Patient complaints of globus sensation should always be investigated with indirect laryngoscopy and not treated with empiric medical therapy. Office-based endoscopic removal of airway foreign bodies can be safely performed but should only be undertaken with proper instrumentation, topical anesthesia, and emergency supplies.

Acknowledgments: David Saltzman, DO, FACCP, provided valuable input in the preparation of this manuscript

Thursday, April 11, 2013

Agenda At A Glance

7:30-8:00am	ABEA Business Meeting (Members Only)
8:00-8:10am	Presidential Welcome
8:10- 9:00am	Panel II: Voice Health Institute – Subglottic Stenosis
9:00- 9:45am	Session VI: Swallowing/Dysphagia
9:28- 9:35am	Discussion
9:35-10:05am	Break with Exhibitors
10:05-10:33am	Session VII: RRP
10:26-10:33am	Discussion
10:33-10:38am	Chevalier Jackson Award
10:38-10:58am	Chevalier Jackson Lecture
10:58-11:26am	Session VIII: Emerging Technology
11:19-11: 26am	Discussion
11:26-12:07pm	Session IX: Regenerative Medicine
11:47-11:54am	Discussion
11:54-12:00 pm	Introduction of New President
12:00-1:00pm	Adjourn/Break with Exhibitors

8:10-9:00AM THURSDAY, APRIL 11, 2013

PANEL II:

Voice Health Institute – Subglottic Stenosis

Moderator: Michael Rutter, MD

Panel: Christian Sittel, MD
C. Blake Simpson, MD
Marshall Strome, MD
Karen Zur, MD

9:00-9:45AM THURSDAY, APRIL 11, 2013

SESSION VI:

Swallowing/Dysphagia

Moderators: Dinesh Chhetri, MD
Markus Hess, MD

9:00-9:07AM THURSDAY, APRIL 11, 2013

GRIP STRENGTH AND WALK SPEED TO IDENTIFY PATIENTS WITH DYSPHAGIA

Bridget Hathaway, MD, Presenter

Danielle Columbe, MD, Co-Presenter

Jonas Johnson, MD, Co-Presenter

Libby Smith, MD, Co-Presenter

Alec Vaezi, MD, Co-Presenter

Tamara Wasserman-Wincko, MD, Co-Presenter

PITTSBURGH, PA

Purpose: Frailty may contribute to dysphagia and aspiration. Early identification of patients at risk of aspiration is important and would lead to reduced morbidity and health care costs. We therefore wondered whether objective measurements of frailty could help identify patients at risk for dysphagia and aspiration.

Methods: Consecutive patients (n=186) referred to the swallowing clinic were enrolled. Patient characteristics and objective measures of frailty were recorded. Variables tested included age, BMI, grip strength, and 5 meter walk pace. Statistical analysis tested for association between these parameters and oropharyngeal dysphagia or aspiration, diagnosed by instrumental swallowing examination.

Results: Patients with dysphagia and aspiration had general traits of frailty. Patients with dysphagia were older (mean 70.6 vs. 61.5; $p=0.0002$) and had a lower BMI (mean 23.4 vs. 26.8; $p<0.0001$). Non-ambulatory patients were also at high risk of dysphagia ($p=0.0026$) and aspiration ($p=0.025$). For ambulatory patients, slower walking pace ($p=0.057$) and weaker gender-normalized grip strength ($p=0.004$) were observed in patients with oropharyngeal dysphagia, which by itself was a significant risk for aspiration ($p<0.0001$). Results were more pronounced when head and neck cancer patients (n=63) with iatrogenic dysphagia were excluded from the analysis. Neither grip strength ($p=0.253$) nor walking pace ($p=0.15$) were independent predictors of aspiration.

Conclusion: Weak grip strength and slow walk speed identify patients at risk of oropharyngeal dysphagia. Since these patients have a high aspiration rate, we suggest that the role of grip strength and walking pace deserves further evaluation in screenings of populations at risk.

9:07-9:14AM THURSDAY, APRIL 11, 2013

TEMPORAL MEASUREMENTS OF DEGLUTITION IN DYNAMIC MAGNETIC RESONANCE IMAGING VERSUS VIDEOFLUOROSCOPY

Marissa Lafer, MD, Presenter
Stratos Achlatis, MD, Co-Presenter
Milan Amin, MD, Co-Presenter
Ryan Branski, MD, Co-Presenter
Cathy Lazarus, MD, Co-Presenter
Pippa Storey, MD, Co-Presenter
NEW YORK, NY

Purpose: To assess the reliability and consistency of dynamic magnetic resonance imaging (dMRI) in visualizing deglutition in healthy volunteers in the supine position with respect to the current gold standard of videofluoroscopy.

Design and Methods: Eighteen healthy volunteers underwent turbo-fast low angle shot using a 3-Tesla magnetic resonance scanner while they swallowed liquid and pudding boluses delivered via syringe into the oral cavity. Thirty sequential images were acquired over 3300ms for each swallow. Imaging was performed in the midsagittal plane at the level of the oropharynx and pharyngoesophageal segment. Evaluations focused on oral transit time, pharyngeal transit time, and rater reliability.

Results: All subjects tolerated the study protocol without complaint. Oral transit time was found to be shorter in the supine position as a result of the bolus sitting farther back in the oral cavity prior to the initiation of the swallow. Pharyngeal transit time was consistent with the literature. Imaging provided by this sequence provided high temporal resolution with the ability to depict deglutition in the midsagittal plane consistent with videofluoroscopy. Additionally, inter- and intra-rater reliability was found to be very high.

Conclusions: Using the described dMRI technique to visualize the swallow sequence is reliable and consistent with the current gold standard videofluoroscopy.

9:14-9:21AM THURSDAY, APRIL 11, 2013

OBJECTIVE VIDEOFUOROSCOPIC SWALLOWING FINDINGS IN INDIVIDUALS WITH ALS

Amanda Domer, MD, Presenter

Peter C. Belafsky, MD, PhD, Co-Presenter

DAVIS, CA

E. K. Plowman, MD, Co-Presenter

TAMPA, FL

Purpose: Amyotrophic lateral sclerosis (ALS) is a progressive neurologic disease with devastating effects on deglutition. The purpose of this study was to objectively compare videofluoroscopic swallowing findings in individuals with ALS to established normative data.

Methods: Nineteen consecutive individuals with ALS were prospectively evaluated. All individuals underwent a videofluoroscopic swallowing study. Objective information regarding approximation of the larynx and hyoid (HLx), maximum opening of the pharyngoesophageal segment (PESm), pharyngeal constriction ratio (PCR), oropharyngeal (OPT) and hypopharyngeal (HPT) transit times, PES opening duration (PESdur), and Penetration/Aspiration Scale (PAS) score were calculated, tabulated, and compared to established normative data.

Results: The mean age of the cohort was 64 (+/- 12) years, and 47% were female. The sample means compared to normative data were 1) HLx was 1.35 (+/- 0.66) vs. 1.04 (+/- 0.21) [$p>0.05$], 2) PESm was 0.69 (+/- 0.18) vs. 0.725 (+/- 0.175) [$p>0.05$], 3) PCR was 0.17 (+/- 0.16) vs. 0.09 (+/- 0.03) [$p>0.05$], 4) OPT was 0.30 (+/- 0.19) vs. 0.245 (+/- 0.015) [$p>0.05$], 5) HPT was 1.01 (+/- 0.85) vs. 0.44 (+/- 0.2) [$p<0.05$], 6) PESdur was 0.61(+/- 0.15) vs. 0.355 (+/- 0.145) [$p<0.05$], and PAS score was 3.02 (+/- 2.90) vs. 1.00 (+/- 0.00) [$p<0.05$]. Five of 19 (26%) individuals aspirated, and 3/19 (16%) silently aspirated.

Conclusions: Individuals with ALS evidenced an elevated PCR, indicating significant pharyngeal weakness. Prolonged hypopharyngeal transit time and PES opening duration were observed, and airway protection during swallowing was significantly impaired. This is the first report of objective biomechanical swallowing parameters in individuals with ALS.

9:21-9:28AM THURSDAY, APRIL 11, 2013

VOLITIONAL CONTROL OF THE UPPER ESOPHAGEAL SPHINCTER WITH BIOFEEDBACK

Maggie Kuhn, MD, Presenter

Amanda Domer, MD, Co-Presenter

Peter C. Belafsky, MD, PhD, Co-Presenter

DAVIS, CA

Introduction: Dysfunction of the upper esophageal sphincter (UES) is associated with swallow disability and globus pharyngeus. Although volitional augmentation of the UES has been previously documented, the ability of persons to control UES pressure with biofeedback has not been assessed.

Purpose: To evaluate the ability of patient-driven high-resolution manometry (HRM) biofeedback to control UES pressure.

Methods: HRM was performed on five healthy patients with no history of dysphagia. Patients were educated and trained on real-time HRM-driven biofeedback to both elevate and reduce UES pressure. Baseline measures (mmHg) were compared to biofeedback-driven volitional increases and decreases in UES pressure. Pre- and post- biofeedback data were compared with the non-parametric Wilcoxon signed-rank test.

Results: The mean age of the cohort was 32.8 (+/-8.5) years. Eighty percent (4/5) were female. The mean UES baseline pressure was 47.6 (+/- 15.1) mmHg. This increased 270% to 170.8 (+/- 85.0) mmHg with biofeedback-driven UES tightening ($p<0.05$) and decreased 97.6% to 2.2 (+/- 9.8) mmHg with biofeedback-driven UES relaxation ($p<0.05$).

Conclusion: Volitional control of upper esophageal sphincter pressure is possible with HRM-guided biofeedback. This may have significant implications for the future treatment of UES disorders and warrants further investigation.

10:05-10:33AM THURSDAY, APRIL 11, 2013

SESSION VII:

RRP

Moderators: Seth Dailey, MD
Gerhard Friedrich, MD

10:05-10:12AM THURSDAY, APRIL 11, 2013

THE CLINICAL COURSE OF RECURRENT RESPIRATORY PAPILLOMATOSIS: A COMPARISON BETWEEN HPV 6 AND HPV 11

Robin E. A. Tjon Pian Gi, MD, Presenter
Michel R. M. San Giorgi, MD, Co-Presenter
Bernard F. A. M. van der Laan, MD, Co-Presenter
Frederik G. Dijkers, MD, Co-Presenter
Lorianne Menkema, MD, Co-Presenter
Bettien van Hemel, MD, Co-Presenter
Ed Schuurin, MD, Co-Presenter
GRONINGEN, THE NETHERLANDS

Introduction: Contradictory results about the aggressiveness of recurrent respiratory papillomatosis (RRP) caused by either HPV 11 or HPV 6 have been reported. Some studies attribute a worse clinical course to HPV 11. Most used inconclusive virus typing methods. This investigation aims to describe differences in the clinical course of RRP caused by HPV 6 or HPV 11 proved by HPV type specific polymerase chain reaction (PCR).

Methods: A retrospective cohort study of 73 patients diagnosed with RRP between 1974 and 2012 was performed. All patient charts, operation reports, and video and photo documentation were retrospectively analyzed. Surgeries were scored on the Derkay score, the Dijkers score, and complications.

Results: The median of surgeries per patient was five for both groups with a median follow-up of nine years. There was significant difference ($p=0.037$) in total surgical frequency between the HPV 6 and HPV 11 group. The HPV 11 group showed significantly more extralaryngeal involvement, distal involvement, and a higher mean Derkay score.

Conclusion: The surgical frequency in patients with RRP is highest in the first years after diagnosis. HPV 11 induces a prolonged higher frequency of surgeries, more extralaryngeal involvement, and more distal involvement. HPV 11 attributes to a more aggressive clinical course.

10:12-10:19AM THURSDAY, APRIL 11, 2013

CO-LOCALIZATION OF CD8+ T-CELLS AND PD-L1 IN RECURRENT RESPIRATORY PAPILOMATOSIS

Simon Best, MD, Presenter

Belinda Akpeng, MD, Co-Presenter

Justin Bishop, MD, Co-Presenter

Sara Pai, MD, Co-Presenter

BALTIMORE, MD

Purpose: Generation of a local immunosuppressive environment is a hypothesized mechanism enabling human papillomavirus types 6 and 11 to maintain a state of chronic viral infection in the setting of an otherwise normal immune system. Upregulation of the T-cell coinhibitory receptor programmed death 1 (PD-1) and its ligand PD-L1 has been demonstrated in a wide variety of tumors and is one known mechanism of tumor immune evasion. We hypothesized that this pathway is involved in recurrent respiratory papillomatosis (RRP).

Design and Methods: Fresh papilloma samples were obtained under IRB approval and prepared for immunohistochemistry and immunofluorescent studies. Double labeling was performed using anti-CD8+ and anti-PD-L1 antibodies. Confocal or light microscopy was used to examine staining patterns and was reviewed by a head and neck pathologist.

Results: Low levels of both CD8+ and PD-L1 expression were observed in RRP samples. The expression was primarily confined to the basal layer of the epithelium, adjacent to the central vascular core of the papilloma. Confocal microscopy demonstrated co-localization of antibody expression with spatial overlap confirmed by immunofluorescence.

Conclusions: This study provides the first direct evidence that the interaction between PD-1 expression on CD8+ T-cells and PD-L1 expression on papilloma may play a role in the local immunosuppressive environment in RRP. Monoclonal anti-PD-L1 antibodies have a demonstrated anti-tumor effect in Phase I clinical trials and may play a future role in the directed treatment of RRP.

10:19-10:26AM THURSDAY, APRIL 11, 2013

HIGH-DOSE INTRALESIONAL BEVACIZUMAB FOR PEDIATRIC RECURRENT RESPIRATORY PAPILOMATOSIS

Douglas Sidell, MD, Presenter

Robin Cotton, MD, Co-Presenter

Alessandro de Alarcon, MD, Co-Presenter

Michel Nassar, MD, Co-Presenter

CINCINNATI, OH

Steven Zeitels, MD, Co-Presenter

BOSTON, MA

Objective: The safety and dosing of vascular endothelial growth factor (VEGF) inhibitor bevacizumab (Avastin) has been reported for the adult with recurrent respiratory papillomatosis (RRP). The objective of this study is to review and report the use of high-dose bevacizumab for the treatment of RRP in the pediatric patient. This preliminary review represents the largest pediatric cohort reported to date.

Design: Retrospective review.

Methods: Patients 21 years of age and younger with pediatric-onset RRP undergoing bevacizumab (25mg/ml) injections by a single practitioner were included. The protocol entailed a series of five consecutive sub-epithelial injections at four-to-six-week intervals with concomitant 532nm KTP laser ablation. Lesions were staged using the Derkay system. Outcomes include pre- and post-treatment Derkay severity score and time interval between procedures. Demographic data extracted include age at diagnosis, current age, race/ethnicity, and gender.

Results: Nine patients were included in this study with a median age of 7 years (range 3-21 years). The mean injection dose was 14.25mg (range 5-45mg). There was a median Derkay score of 11.5 (range 4-23) at the time of diagnosis and a median 49% improvement in scoring upon completion of the protocol. All patients demonstrated an increased time interval between

injections with a median 2.05x time increase (range 1.6x-3.25x).

Conclusions: Growing evidence exists in support of VEGF as an important factor in the development of RRP. While some variability in response is demonstrated by this study, high-dose bevacizumab appears to provide promising results as an adjunct to photoangiolytic KTP ablation for the pediatric patient.

10:33- 10:38AM

THURSDAY, APRIL 11, 2013

Chevalier Jackson Award

Presented by Peter J. Koltai, MD, FACS

To Seth Pransky, MD

Recognition of Chevalier Jackson Award Recipients

1959-2012

1959 Louis H. Clerf, MD

1960 None

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

1989 Bernard R. Marsh, MD

1990 David R. Sanderson, MD

1991 William W. Montgomery, MD

1992 John A. Tucker, MD

1993 Gerald B. Healy, MD

1994 Vincent J. Hyams, MD

1995 Lauren D. Holinger, MD

1996 Stanley M. Shapshay, MD

1997 Robert H. Ossoff, MD

1998 John Frederickson, MD

1999 Eiji Yanagisawa, MD

2000 William W. Montgomery, MD

2002 Jack L. Gluckman, MD

2003 Ellen M. Friedman, M.D.

2004 Robin T. Cotton, M.D.

2005 Charles W. Vaughn, MD

2006 Andrew Blitzer, MD, DDS

2007 Gayle E. Woodson, MD

2008 Robert J. Toohill, MD

2009 Peter J. Koltai, MD, FACS

2010 Clarence T. Sasaki, MD

2011 Peak Woo, MD

2012 W. Frederick McGuirt, Sr., MD

10:38-10:58AM THURSDAY, APRIL 11, 2013

Introduction of the Chevalier Jackson Lecture

Presenter: Peter J. Koltai, MD, FACS

Chevalier Jackson Lecture

Nelson Powell, MD

Palo Alto, CA

Previous Chevalier Jackson Lecturers

1964	D.F.N. Harrison, MD	London, England
1965	Eric Carlens, MD	Stockholm, Sweden
1966	John L. Pool, MD	New York, NY
	Presentations by:	
	Ernest L. Wynder, MD	
	Paul H. Holinger, MD	
	Leslie Bernstein, MD	
	Robert H. Sageman, MD	
1967	Professor Eelco Hizinga, MD	Groningen, Holland
1968	Paul H. Holinger, MD	Chicago, IL
1969	Plinio de Mattos Baretto, MD	Sao Paulo, Brazil
1970	James R. Jude, MD	Miami, FL
1971	Jo Ono, MD	Tokyo, Japan
1972	G. Gordon McHardy, MD	New Orleans, LA
1973	Hermes C. Grillo, MD	Boston, MA
1974	John R. Gutelius, MD	Kingston, Canada
1975	Donald O. Castell, MD	Philadelphia, PA
1976	Paul Moore, PhD	Gainesville, FL
1977	Mary Ellen Avery, MD	Boston, MA
1978	George Berci, MD	Los Angeles, CA
1979	Gabriel F. Tucker, Jr., MD	Chicago, IL
1980	Flavio Aprigliano, MD	Sao Paulo, Brazil
1981	Peter Stradling, MD	Somerset, England
1982	Arthur M. Olsen, MD	Rochester, MN
1983	Bruce N. Benjamin, MD	Sydney, Australia
1984	Ronan O'Rahilly, MD	Davis, CA
1985	John A. Tucker, MD	Philadelphia, PA
1986	William G. Anlyan, MD	Durham, NC
1987	Tu Guy-Yi, MD	Beijing, PR of China
1988	Lucius Hill, MD	Seattle, WA

1989	Bernard R. Marsh, MD	Baltimore, MD
1990	David R. Sanderson, MD	Scottsdale, AZ
1991	Michael E. Johns, MD	Baltimore, MD
1992	Whitney Addington, MD	Chicago, IL
1993	Henry J. Heimlich, MD	Cincinnati, OH
1994	John A. Kirchner, MD	Woodbridge, CT
1995	Minoru Hirano, MD	Krume, Japan
1996	Harold C. Pillsbury, III, MD	Chapel Hill, NC
1997	Gerald Healy, MD	Boston, MA
1998	Robin T. Cotton, MD	Cincinnati, OH
1999	Jamie Koufman, MD	Winston-Salem, NC
2000	Stanley Shapshay, MD	Boston, MA
2001	Paul A. Levine, MD	Charlottesville, VA
2002	Steven D. Gray, MD	Salt Lake City, UT
2003	Wolfgang Steiner, MD	Gottingen, Germany
2004	Jonathan Aviv, MD	New York, NY
2005	John Ward, MD	Chicago, IL
2006	Steven M. Zeitels, MD	Boston, MA
2007	Peak Woo, MD	New York, NY
2008	Reza Shaker, MD	Milwaukee, WI
2009	Jamie Koufman, MD	New York, NY
2010	Clarence T. Sasaki, MD	New Haven, CT
2011	Jeffrey Laitman, MD, PhD	New York, NY
2012	Martin A. Birchall, MD	London, England

10:58-11:26AM THURSDAY, APRIL 11, 2013

SESSION VII:

Emerging Technology

Moderators: Clark Rosen, MD
Christian Sittel, MD

10:58-11:05AM THURSDAY, APRIL 11, 2013

THE ARYTENOID REPOSITIONING DEVICE

Henry Hoffman, MD, Presenter

Andrew Heaford, MD, Co-Presenter

Douglas Van Daele, MD, Co-Presenter

Janice Ahlrichs Hanson, MD, Co-Presenter

UNIVERSITY HEIGHTS, IA

Seth Dailey, MD, Co-Presenter

MADISON, WI

Jonathan Bock, MD, Co-Presenter

MILWAUKEE, WI

Purpose: We report development of a device and a technique to manage laryngeal paralysis through minimal access arytenoid adduction (for unilateral paralysis) and arytenoid abduction (for bilateral paralysis).

Design and Methods: Human cadaver work was coupled with directed engineering to develop instrumentation to secure the muscular process of the arytenoid into favorable adducted or abducted positions. Digital video, still photography, and three-dimensional CT imaging of cadaveric larynges were done to evaluate positioning of the device.

Results: Testing of prototypes identified the ideal implant to be a 0.6 mm titanium wire with a distal spring-wound coil permitting placement through a small drill hole in the anterior thyroid cartilage placed 5 mm above the lower thyroid cartilage and 5 mm lateral to the midline. Endoscopic view of light via transillumination through a trocar positioned in the paraglottic space consistently identified successful submucosal placement of the trocar tip in the inferior medial wall of the pyriform sinus adjacent the muscular process of the arytenoid cartilage. Placement of the titanium device through the trocar permitted rotation with the distal coil to engage the soft tissue about the muscular process. Withdrawal of the trocar then permitted manipulation of the titanium device to adduct or abduct the vocal fold. A two-hole specially adapted 2 mm plate was then employed to secure

the implant at its entry point into the anterior thyroid cartilage. Three-dimensional CT imaging coupled with review of video documentation established the feasibility of this technology to advance to further study.

Conclusions: Successful application of advances in technology and instrumentation confirms the feasibility of minimal access arytenoid adduction and abduction.

11:05–11:12AM THURSDAY, APRIL 11, 2013

PICOSECOND INFRARED LASER (PIRL) – AN IDEAL PHONOMICROSURGICAL LASER?

Markus Hess, MD, Presenter

Michael Dominik Hildebrandt, MD, Co-Presenter

Michael Kammal, MD, Co-Presenter

Sebastian Kruber, MD, Co-Presenter

Peter Kroetz, MD, Co-Presenter

Dwayne Miller, MD, Co-Presenter

Frank Müller, MD, Co-Presenter

Klaus Püschel, MD, Co-Presenter

Rudolph Reimer, MD, Co-Presenter

Udo Schumacher, MD, Co-Presenter

Wolfgang Wöllmer, MD, Co-Presenter

HAMBURG, GERMANY

Purpose: In search for new atraumatic phonosurgical instruments, we investigated a picosecond pulsed infrared laser tuned to the water absorption band and compared it to CO₂ laser and cold instruments.

Methods: Excised human vocal folds were incised with the picosecond infrared laser (PIRL). PIRL settings were 2.96 microns wavelength, 100 picoseconds pulse duration, 500 Hz pulse duration, energy approx. 0.2 mJ, fluence approx. 0.6 J/cm². For comparison, similar dissections were performed with a CO₂ laser and with a scalpel. Tissue analyses included assessment for coagulation, carbonization, and structural changes of lamina propria with microscopy, electron microscopy, and histology.

Results: PIRL damage zones were far below 100 microns, in best cases at a single cell damage width (approx. 10 microns). CO₂ laser cuts and scalpel incisions showed destruction zones at 50 to 100 microns, and sometimes even >200 microns.

Conclusions: Using PIRL technology in excised human vocal folds may reduce peri-incisional damage zones (at best) to the single cell level, when compared to CO₂ laser and scalpels with far more “collateral” damage zones. Although not clinically

available yet, PIRL technology seems very promising for future phonomicrosurgery. In theory, PIRL shows no or negligible heating, shockwave generation, and ionization. Further investigations address beam delivery systems, beam profiling, and long-term healing effects.

11:12-11:19AM THURSDAY, APRIL 11, 2013

THE LARYNGOFISSURE RETRACTOR: A NEW TOOL FOR OPTIMIZED ATRAUMATIC EXPOSURE

Christian Sittel, MD, Presenter

Constantin Koelmel, MD, Co-Presenter

STUTTGART, GERMANY

Introduction: Open surgery remains an important modality for surgery of the laryngotracheal junction in children and adults. Many specialized tools have been developed for endoscopic microsurgery in the past. In contrast, few instruments allowing for microsurgical open surgery are available.

Methods: The laryngofissure retractor has four key aspects. The design is modular, and a wide variety of different spatula can be attached to the same slim body. The opening is parallel due to the pivot-mounted spatula. Adjustment is possible in minimal increments and is self-retaining. The cranial part is bent upward to match the anatomy of the anterior neck and chin.

Results: Clinical use of the laryngofissure retractor has been investigated in the following indications: laryngotracheal reconstruction in children, allowing for improved and atraumatic exposure of the cricoid plate; benign and malignant lesions of the vocal cords if endoscopic exposure was not possible; and organ-preserving surgery of highly differentiated chondrosarcoma of the cricoid. In all cases minimal invasive access was granted, allowing for microsurgical manipulation.

Conclusions: The laryngofissure retractor is a highly versatile tool for a minimally invasive open approach to the laryngotracheal junction in children and adults. Better exposure is accomplished in a less traumatic way. The laryngofissure retractor is CE-marked and on sale by a Germany-based instrument manufacturer.

Disclosure: The authors have developed the device in collaboration with Richard-Wolf Germany. They do not benefit financially from the sale of the product.

11:26-12:07PM THURSDAY, APRIL 11, 2013

SESSION IX:

Regenerative Medicine

Moderators: Milan Amin, MD
Ferhan Oz, MD

11:26-11:33AM THURSDAY, APRIL 11, 2013

REGENERATION POTENTIAL OF CHRONICALLY SCARRED VOCAL FOLD FIBROBLASTS: AN IN VITRO STUDY

Markus Gugatschka, MD, Presenter
Herwig Ainoedhofer, MD, Co-Presenter
Gerhard Friedrich, MD, Co-Presenter
Hans-Jürgen Gruber, MD, Co-Presenter
Karl Kiesler, MD, Co-Presenter
Amulya Saxena, MD, Co-Presenter
GRAZ, AUSTRIA

Shigeru Hirano, MD, Co-Presenter
KYOTO, JAPAN

Introduction: Scar fibroblasts (SF) are the main cell type of chronically scarred vocal folds (VF). Many attempts in scar restoration aim at stimulation of these cells. Previous experiments showed good results in freshly injured VFs, but data about the remodeling behavior of fibroblasts from chronically scarred VF are still missing.

Methods: We compared expression capacities of rats' SF derived from chronically scarred VF three months after injury and normal fibroblasts (NF) in an in vitro experiment. Measurements of hyaluronic acid were done in both aforementioned cell types alone and after stimulation with mesenchymal stem cells (MSC). Hyaluronic acid was determined by ELISA on days 1, 3, 5, and 7.

Results: NF and SF alone showed no change in HA production throughout the experiment, and levels of HA were lower in the SF group. NF and SF increased significantly the production of HA after co-culturing with MSC, with a peak on day 5.

Conclusions: Our results suggest that fibroblasts from chronically scarred VF are highly inducible in terms of HA production by stimulation with stem cells.

11:33-11:40AM THURSDAY, APRIL 11, 2013

EFFECTS OF MITOMYCIN C ON HUMAN VOCAL FOLD FIBROBLAST CULTURES

Frederik G. Dijkers, MD, Presenter
GRONINGEN, THE NETHERLANDS

Nicole Y. K. Li, MD, Co-Presenter
Susan L. Thibeault, MD, Co-Presenter
MADISON, WI

Fei Chen, MD, Co-Presenter
HONG KONG

Introduction: Conflicting in vivo results are reported regarding the benefits of mitocycin C (MMC) in laryngeal scar management. This in vitro investigation evaluates the cytotoxicity and anti-fibrotic effect of MMC on cultured human vocal fold cells.

Methods: Cultures of human normal and scarred vocal fold fibroblast were subjected to MMC treatment in various clinically used doses. Cell cytotoxicity tests were performed to measure the live and dead cells in the cultures at various time points. Collagen types I and III production were evaluated using immunocytochemistry staining and western blots.

Results: The number of cells in MMC-treated cultures decreased significantly by four-fold ($p < 0.05$) one day after MMC treatment. The number remained similar at three-day and five-day time points. At day five, the percentage of living cells in MMC-treated cultures decreased significantly by 50% compared to day 0 ($p < 0.05$). No significant dose effects were noted among the treatment group.

Conclusions: The number of fibroblasts was significantly reduced after MMC-treatment. Results suggested that MMC induces fibroblast apoptosis and secondary necrosis, compromising cell membrane integrity. Concomitantly the cytosolic proteins are thus released into the extracellular environment. Collectively our results will provide insights on the underlying mechanism of MMC action in fibroblast activity.

11:40-11:47AM THURSDAY, APRIL 11, 2013

MECHANICAL REGULATION OF HUMAN VOCAL FOLD STELLATE CELLS

Kiminori Sato, MD, Presenter
Takashi Kurita, MD, Co-Presenter
Shun-ichi Chitose, MD, Co-Presenter
Hirohito Umeno, MD, Co-Presenter
Tadashi Nakashima, MD, Co-Presenter
FUKUOKA, JAPAN

Purpose: Vocal fold stellate cells (VFSCs) in the human maculae flavae (MFe) are inferred to be involved in the metabolism of extracellular matrices essential for the viscoelasticity of the human vocal fold mucosa. Our previous studies have supported the hypothesis that the tension caused by phonation (vocal fold vibration) regulates the behaviors of the VFSCs in the human MFe. It is generally accepted that tensile and compressive strains have direct effects on cell morphology and structure including changes in cytoskeletal structure and organization. Cytoskeletons play the role of mechanoreceptor of the cells. The microstructure of the intermediate filaments and the expression of their proteins were investigated in the VFSCs in MFe that have remained unphonated since birth.

Methods: Three adult vocal fold mucosae that have remained unphonated since birth were investigated by immunohistochemistry and electron microscopy.

Results: When examined by electron microscopy, the intermediate filaments of the VFSCs were fewer in number. The expression of their characteristic proteins (vimentin, desmin, glial fibrillary acidic protein) was also reduced.

Conclusions: Vocal fold vibration has direct effects on VFSC morphology and structure, such as cytoskeletal structure and organization. The VFSCs in MFe that have remained unphonated since birth have a decreased number of mechanoreceptors in the cells. This supports the hypothesis that vocal fold vibration regulates VFSC behaviors in the human MFe. The function

and fate of VFSCs are regulated by various microenvironmental factors. In addition to chemical factors, mechanical factors also appear to modulate VFSC behaviors.

11:54-12:00PM THURSDAY, APRIL 11, 2013

Introduction of New President

Rules Concerning the Presentation of Papers At The Annual Meeting

- The reading of any paper shall not extend beyond the time allotted by the Program Committee. The exact time for presentation will be allotted by the Program Committee. This shall include presentation of slides, pictures and video demonstrations.
- Copies of the manuscript must be submitted prior to podium presentations. If the presenter does not comply with this rule, the paper may not be presented. Manuscripts for poster presentations are optional. One copy of the manuscript should be submitted to The Annals of Otology, Rhinology & Laryngology and one should be uploaded through the online submission format through the ABEA website process. ABEA will distribute your manuscript copies to the session moderator and program director. Additional instructions for those seeking awards are posted on the ABEA website.
- All papers become the property of the ABEA.
- The Annals Publishing Company reserves the right to publish articles in the Annals of Otology, Rhinology, and Laryngology. The author may publish a paper elsewhere only if the paper is not accepted for publication in the Annals. Written permission must be obtained from the Editor of the ABEA.
- Only original and unpublished papers may be submitted for consideration. The same or similar abstract should not be submitted simultaneously to any other meeting or publication.

Combined Scientific Poster Session

American Broncho-Esophagological Association

American Laryngological Association

European Laryngological Association

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 (96-167) of this program booklet.

1-002

ELECTROMYOGRAPHIC FINDINGS FOR NERVE-MUSCLE PEDICLE IMPLANTATION COMBINED WITH ARYTENOID ADDUCTION FOR UNILATERAL VOCAL FOLD PARALYSIS

Tetsuji Sanuki, MD

Takashi Aoyama, MD

Narihiro Kodama, MD

Yoshihiko Kumai, MD

Kohei Nishimoto, MD

Eiji Yumoto, MD

KUMAMOTO, JAPAN

Objectives: To evaluate the long-term efficacy of laryngeal reinnervation of nerve-muscle pedicle (NMP) implantation for unilateral vocal fold paralysis (UVFP) using laryngeal electromyography (LEMG) and assessment of phonatory function.

Methods: Videostroboscopy, acoustic analysis, perceptual evaluation, aerodynamic analysis, and LEMG were performed prior to and two years postoperatively. Ten patients with UVFP received NMP implantation combined with arytenoid adduction. For LEMG analysis, a four-point scale was employed to grade motor unit (MU) recruitment where 4+ represented absent recruitment, 3+ represented greatly decreased recruitment, 2+ represented moderately decreased recruitment, and 1+ represented mildly decreased activity with less than full interference pattern.

Results: In all patients, videostroboscopy, acoustic analysis, perceptual evaluation and aerodynamic analysis were significantly improved postoperatively. In LEMG findings, preoperative MU recruitment evaluation results were one patient for 1+, five for 2+, one for 3+, and three for 4+. Postoperative MU recruitment evaluation results were seven patients for 1+, three for 2+, and none for 3+ and 4+. There was a significant postoperative improvement in voluntary MU recruitments during phonation.

Conclusion: LEMG findings demonstrated that NMP implantation resulted in successful reinnervation of laryngeal muscle in UVFP patients. Reinnervation of NMP implantation combined with arytenoid adduction provides excellent long-term voice outcomes for paralytic dysphonia.

1-003

FINDINGS AND MANAGEMENT OF OLDER PATIENTS WITH DOCUMENTED DYSPHAGIA AT A TERTIARY CENTER

Pelin Kocdor, MD

Ozlem E. Tulunay-Ugur, MD

LITTLE ROCK, AK

Objective: To determine the laryngoscopic and videofluoroscopic swallowing study (VFSS) findings in patients over 65 with documented dysphagia and to evaluate management options.

Methods: Retrospective chart review. Patients over 65 years-old were included. Demographics, co-morbidities, laryngoscopic findings, swallowing studies and treatment modalities of 50 consecutive patients, seen at a tertiary Laryngology Clinic were reviewed. Head and neck cancer, stroke patients were excluded.

Results: Mean age of the patients was 76 years-old (range=66-91). There was female dominance of 64%. 76% of the patients were on reflux medication. 22% of the patients had weight loss. 50% of patients were complaining of food getting stuck in throat, 32% had solid dysphagia. 52% had choking sensation or aspiration, 32% had globus sensation. On laryngoscopy, 6% had pooling in the pyriform sinuses, 30% had a glottic gap, 12% had vocal fold paralysis and 6% paresis. VFSS showed 28% of patients had oropharyngeal, 22% pharyngoesophageal, and 14% pharyngeal dysphagia; 32% had a normal study. While 20% had laryngeal penetration, 12% had aspiration. There was post-swallow vallecular and pyriform sinus residue in 34% and 26%, respectively. Twenty percent of the patients underwent a surgical intervention in the form of botulinum toxin injection, dilatation or vocal fold injection. While 18% received swallowing therapy, 14% underwent diet modification. Therefore, 68% of the patients needed some type of treatment.

Conclusion: Swallowing problems in the elderly is not uncommon, and can present with vague symptoms. The clinician needs to be diligent, as a large number of these patients will require treatment.

1-004

THE EGFR SIGNALING PATHWAY AS A TARGET FOR THERAPY IN HUMAN PAPILLOMAVIRUS-ASSOCIATED TUMORS

Brianna Crawley, MD
Pamela Barraza, MD
Anastacia Maldonado, MD
Michelle Ozbun, MD
ALBUQUERQUE, NM

Julie Bauman, MD
PITTSBURGH, PA

Objectives: Human papillomavirus (HPV) driven aerodigestive tract tumors comprise more than half of the head and neck squamous cell malignancies in the US and pre-malignant recurrent respiratory papillomatosis (RRP). We posit that variably expressed EGFR and downstream signals are integral to efficient HPV replication and post-infection cell proliferation.

Methods: Testing was undertaken in infected cells maintaining episomal or integrated HPV genomes. The HPV[-] normal immortalized human foreskin keratinocyte cell line, NIKS, and its HPV16[+] counterpart (SG3), which maintains episomal copies of HPV16, were treated with PD98059, a MEK inhibitor, or cetuximab, a humanized monoclonal antibody to EGFR. Total proteins were examined by SDS-PAGE and immunoblot analyses to assess p53 and pRb protein levels. Nucleic acids were analyzed by RT-qPCR or qPCR for drug-mediated changes in levels of viral early transcripts and viral genome copy numbers, respectively. Cell viability and growth assays were performed. Both HPV[-] and HPV[+] cell lines demonstrated decreased EGFR/MAPK signaling and growth rates after treatment with PD98059 and cetuximab.

Results: Both drugs caused a statistically significant decrease in viral early RNAs in HPV[+] cells. A statistically significant reduction in viral genome levels was seen within 48 hours of treatment. Inhibition of the EGFR/MAPK pathway causes down-regulation of viral early transcription and genome levels in HPV16[+] cells and

decreased growth rates in vitro. The EGFR/MAPK pathway may provide an appropriate target for adjuvant therapy in HPV-related tumors.

Conclusion: We are currently testing additional EGFR pathway inhibitors in vitro and will soon be observing their efficacy against these tumors in animals.

1-005

DENTURES AS A RISK FOR FOREIGN BODY INGESTION IN ELDERLY PATIENTS WITH DEMENTIA

Madeleine Samuelson, MD

Soham Roy, MD

Sancak Yuksel, MD

HOUSTON, TX

Objective: To describe a series of ingested dentures in elderly patients with dementia

Methods: Case series

Results: Two elderly patients with dementia were seen for ingested dentures. In both cases, the clasps of the denture lodged deeply into mucosa, making extraction difficult. A 72 year old male with dementia complained of a one day history of dysphagia and his wife noted his denture missing. Plain films confirmed a denture lodged in the post-cricoid area. Extraction was complicated by hooks embedded in the mucosa, but it was removed with minimal difficulty. An 82 year old female in a nursing home with a four month history of progressive dysphagia was seen at another institution for gastrostomy placement. During esophagoscopy the gastroenterologist noted a foreign body in the esophagus. After transfer to our institution, a large piece of denture was identified, lodged in the esophageal inlet. At endoscopy, the foreign body was noted to be lodged deeply into the mucosa and granulated. On removal, a three cm laceration was observed in the inferior pharyngeal wall and was closed primarily. Both patients recovered uneventfully.

Conclusions: Dentures remain a significant risk factor for foreign body aspiration and ingestion in the elderly. In patients with dementia or in those confined to a nursing home, history of foreign body ingestion is often unattainable. A sudden decrease in oral intake or change in behavior should increase suspicion. Embedding of the denture may cause lacerations of the pharynx, or even esophageal perforation. Compelling photographs will be provided.

1-006

TRANSORAL OR TRANSNASAL ESOPHAGEAL FOREIGN BODY EXTRACTION USING TRANSNASAL ESOPHAGOSCOPY

Kiminori Sato, MD

Shun-ichi Chitose, MD

Tadashi Nakashima, MD

Hirohito Umeno, MD

KURUME, JAPAN

Purpose: A videoendoscope has a small diameter and a small CCD (charge-coupled device) chip built into the tip that provides a clear image. This report concerns office-based esophageal foreign body extraction using transnasal videoendoscopy and advantages of this intervention.

Methods: A videoendoscope with a working channel for irrigation, air insufflation and forceps was used. The diameter of the videoendoscope tip was 5.3 mm. Transnasal or transoral esophageal foreign body extraction using transnasal esophagoscopy was performed under surface anesthesia.

Case Report: A seventy-one-year old male complained of having sore throat after taking medicine. An X-ray examination showed the esophageal foreign body (PTP: Press through package medicine). Transnasal esophagoscopy was performed in a sitting position on a procedure chair at the outpatient clinic without sedation. In this case, the foreign body was too large to extract through the nasal cavity. Therefore, after extracting the foreign body as far as the oropharynx, the PTP was extracted transorally.

Conclusions: The advantages of this type of intervention are as follows. 1) Patients can be treated in a sitting position on a procedure chair at the otolaryngology outpatient clinic, which obviates the need for sedation or general anesthesia. 2) The videoendoscope diameter is relatively small and results in less discomfort to the patient. 3) Videoendoscopes present clear dynamic color images on a color video monitor and provide excellent resolution and recording, and thus yielded high diagnostic accuracy and

fine intervention. 4) Pernasal endoscopy allows the doctor to treat patients who have a strong gag reflex. 5) Good image documentation on the color video monitor allows the physician to carry out safe intervention even for elderly patients. A disadvantage of this procedure is that extraction of some varieties of foreign bodies is limited. Esophageal foreign body extraction using a transnasal videoendoscope is a reliable procedure that has widened the indications for office-based foreign body extraction.

1-007

VIDEOFLUOROSCOPIC EVALUATION IN OROPHARYNGEAL SWALLOWING DYSFUNCTION AFTER ESOPHAGECTOMY WITH THREE-FIELD LYMPH NODE DISSECTION FOR ESOPHAGEAL CANCER

Yoshihiko Kumai, MD
Keigo Matsubara, MD
Yasuhiro Samejima, MD
Masayuki Watanabe, MD
Eiji Yumoto, MD
KUMAMOTO, JAPAN

Objective: To examine oropharyngeal swallowing dysfunction following esophagectomy by videofluoroscopy and to determine the effect of rehabilitation maneuvers. Study design: Retrospective review analysis of consecutive case series

Methods: Videofluoroscopic evaluations of the 28 patients, who consulted ENT department from 2006 to 2012, for swallowing dysfunction following esophagectomy with three-field lymph node dissection, were reviewed. Evaluation was performed between 2 to 3 weeks after surgery. The assessment parameters on VF examination are set as follows: laryngeal elevation, bolus residue in the pyriform sinus (PS) after swallowing, laryngeal penetration, and bolus into the trachea (aspiration). Association of aspiration with these parameters, vocal cord (VC) paralysis, and route of gastric pull-up was statistically examined. The effect of rehabilitation maneuvers on aspiration was also examined.

Results: Fourteen (50%) patients demonstrated aspiration. Unilateral VC immobility was noticed in 19 patients (69.6%). Aspiration most often occurred while or before the larynx elevates (82%). Significant differences in the incidence of aspiration were noted according to the assessment parameters for reduced laryngeal elevation ($P=.002$ chi square test), as well as bolus residues in the PS ($P=.004$) but not to the VC paralysis ($P=.06$) and the route of the gastric pull-up ($P=.43$). Aspiration was successfully prevented by the swallowing with chin tuck maneuver in

all patients during VF examination and 26 patients (93%) finally succeeded in oral feeding by the rehabilitation. Conclusion: Oropharyngeal swallowing dysfunction following esophagectomy is significantly correlated with reduced laryngeal elevation.

1-008

REVISION SURGERY AFTER GORE-TEX MEDIALIZATION THYROPLASTY

Nao Hiwatashi, MD

Shigeru Hirano, MD

Juichi Ito, MD

Shin-ichi Kanemaru, MD

Ichiro Tateya, MD

Masanobu Mizuta, MD

Juichi Ito, MD

KYOTO, JAPAN

Objectives: To date, Gore-Tex has become more popular as a shim in medialization thyroplasty for unilateral vocal fold paralysis. However, revision is occasionally required for cases with recurrence of vocal disability. The present study examined revision cases after Gore-Tex medialization thyroplasty.

Methods: Eighty patients underwent GMT procedures between 2004-2012. Revision cases were retrospectively chart-reviewed.

Results: Four patients underwent revision surgery because of recurrence of vocal dysfunction. 2 patients showed progression of vocal fold atrophy on the paralyzed side, 1 on the contralateral side, and the remaining case showed migration of prosthesis. Two patients with progression of atrophy had required early surgical intervention for severe mis-swallowing within 4 months from the onset of paralysis. All patients were treated with re-implant of Gore-Tex in the revision and 1 case required arytenoid adduction. Vocal outcomes indicated improvement of maximum phonation time, mean flow rate and noise-to harmonics ratio without significant complication.

Conclusion: Five percents of cases required revision surgery, including 1 case (1.3%) with migration of prosthesis. Migration of Gore-tex should be warranted even though the occurrence is rare.

1-009

PARAGLOTTIC SPACE FOREIGN BODIES

Peter Baxter, MD

Benjamin Malkin, MD

Uchechukwu Megwalu, MD

NEW YORK, NY

Objective: This is a case series of 3 patients who were treated between May and July 2012.

Methods: The medical records were reviewed, including all imaging and operative reports. In addition, a review of the relevant English-language literature was performed.

Results: In all cases, the patient had ingested a fishbone that had become lodged in the paraglottic space, but each had a unique presentation and management. Patient 1 presented 1 day after ingesting the fishbone; it was removed endoscopically over 3 weeks later on the third attempt. Patient 2 presented 9 days after bone ingestion with a concomitant parapharyngeal space abscess; the abscess was drained externally and the fishbone was removed endoscopically over the course of 2 procedures. Patient 3 presented after 4 days of symptoms and was managed via an external approach to the paraglottic space. All cases required multiple procedures to completely remove the embedded foreign body.

Conclusions: A literature review found few reports of airway foreign bodies in this location.

1-010

TEMPORARY TRACHEOTOMY FOR REMOVAL OF A LARGE AIRWAY FOREIGN BODY - WHEN BRONCHOSCOPY IS NOT ENOUGH

Garani Nadaraja, MD

Wen Jiang, MD

Daniela Carvalho, MD

SAN DIEGO, CA

Purpose of report: Among airway foreign body aspirations, nuts and seeds pose the largest threat due to swelling of the object and inflammation of the tracheobronchial mucosa. Although, most organic matter can be removed endoscopically, we present a case where endoscopic technique was inadequate and a temporary tracheotomy was necessary.

Case Report: A 22 month male presents to the emergency department (ED) in respiratory distress. He was initially seen in the ED one day prior to admission for “choking on his saliva” while playing under his grandmother’s supervision. Plain films at that time were reportedly normal without any evidence of a foreign body. He was observed for a few hours and discharged home. The patient re-presented to the ED 24 hours later with symptoms of coughing and grunting. He was hypoxic with oxygen saturation in the 80’s. On examination, he had nasal flaring, substernal retractions and decreased breath sounds on the right. A chest x-ray showed complete opacification of the right lung field with rightward tracheal deviation (Figure1), concerning for a foreign body.

He was emergently taken to the operating room for a laryngoscopy and bronchoscopy. An organic object obstructing the right mainstem bronchus was visualized (Figure2). The object was grasped using multiple different optical forceps and attempts were made to deliver the object through the subglottis. However, the size of the object was too large. Once moved proximal to the carina, it nearly obstructed the trachea and had to be tilted with a suction catheter to allow adequate ventilation. The object was also too firm to be broken up into pieces. At this time, a decision was made to perform a temporary tracheotomy to remove the

foreign body. While the neck was prepped and draped and a tracheotomy was performed, the object was pushed back into the right mainstem bronchus to allow adequate ventilation. A vertical incision was made at the midline between the 2nd and 3rd tracheal ring. Once the bronchoscope was visualized, the optical forceps was used to bring the foreign body into view. The object was then grasped with a hemostat and removed through the tracheotomy stoma in 2-3 large pieces. The airway was thoroughly inspected endoscopically to ensure that no pieces remained. The tracheotomy was closed over a Penrose drain and the patient was taken to the PICU intubated. After presenting the object to the family, the patient's grandmother recalled that she had spilled pinto beans on the kitchen room floor just prior to the patient's initial choking episode. The dry pinto bean had swelled in the airway, making it impossible to deliver through the subglottis and larynx.

He was successfully extubated on postoperative day 3. A post-extubation x-ray showed symmetric inflation of the lungs. He was discharged home on postoperative day 4 in excellent condition. He was seen 2 weeks later in clinic doing well.

Conclusions: When endoscopic methods prove ineffective, a tracheotomy is a safeguard option for airway foreign body retrieval.

1-011

TREATMENT OF RAT VOCAL FOLD SCAR BY GP46 SILENCING

Yo Kishimoto, MD

Yutaka Toya, MD

Alice Wei, MD

Nathan Welham, MD

MADISON, WI

Purpose: Gp46 is a collagen specific chaperone protein residing in the endoplasmic reticulum. It is essential for the maturation of collagen and thus is thought to play an important role in the progression of fibrosis / scarring. The purpose of this study was to evaluate the therapeutic potential of gp46 silencing for the treatment of chronic vocal fold scar.

Materials and Methods: First, normal and scar rat vocal fold fibroblasts were transfected using gp46-siRNA / liposome complexes at first passage. Transfection efficiency was evaluated using flow cytometry, fluorescent microscopy and qRT-PCR, and effect on collagen synthesis was evaluated via hydroxyproline abundance. Next, the effect of gp46 silencing on chronically scarred vocal folds was examined in vivo. Rat vocal folds were injured bilaterally and allowed to heal for 8 weeks. siRNA complexes were injected into the resulting scarred vocal folds twice per week for 4 weeks. After the final injection, animals were euthanized and the vocal fold mucosa was evaluated for collagen transcription and protein abundance.

Results: Gp46 knockdown was successfully achieved via in vitro transfection, and corresponded to a reduction in collagen synthesis by normal and scar vocal fold fibroblasts. Further, in vivo delivery of gp46-siRNA / liposome complexes reversed the excessive collagen deposition associated with chronic vocal fold scar.

Conclusions: Gp46 silencing is a promising therapeutic strategy for the treatment of vocal fold scar.

1-012

HORNER'S SYNDROME FOLLOWING ZENKER'S DIVERTICULECTOMY

Edward Damrose, MD

Yue Ma, MD

STANFORD, CA

Purpose: To report a case of Horner's syndrome following Zenker's diverticulectomy

Design: Case report from tertiary referral center

Summary: A 62-year-old male with a three year history of dysphagia and a 5x6cm Zenker's diverticulum presented for excision. Past history was significant for two prior endoscopic approaches, the second of which resulted in perforation, and prior anterior cervical fusion at C5 and C6. Surgery was uncomplicated except for the finding of a left Horner's syndrome (pupillary miosis, palpebral ptosis, and facial anhidrosis) postoperatively. At two years follow-up, the patient's Horner's syndrome has persisted. While complications such as fistulization, infection, recurrence, and vocal fold palsy are well-recognized potential consequences of this surgery, a review of the literature shows that this complication has not been described previously.

Conclusion: To our knowledge, this is the first reported case of Horner's syndrome occurring following Zenker's diverticulectomy. Surgeons who perform Zenker's diverticulectomy should be aware of this potential postoperative complication, particularly in patients with a history of prior cervical surgery. Preoperative patient evaluation should also include an ophthalmologic exam to exclude a potentially preexisting Horner's syndrome.

1-013

FLEXIBLE ESOPHAGOSCOPY USE AMONG OTOLARYNGOLOGISTS

Ahmed Soliman, MD

Brian Wernig, MD

Sonya Wexler, MD

PHILADELPHIA, PA

Objective: To determine current practice patterns for esophagoscopy by otolaryngologists in the US with attention to foreign body management.

Methods: A ten-item questionnaire was created on SurveyMonkey and sent via e-mail to all AAOHNS members. A second 6 item survey to assess resident training in flexible esophagoscopy was sent to all US otolaryngology residency program directors.

Results: There were a total of 160 respondents to the first survey from all geographic regions, most of which were in group private practice. Overall, only 21.3% were trained to perform flexible esophagoscopy during residency, whereas 43% of those who graduated after 1990 received this training. Most respondents perform flexible esophagoscopy without sedation in the office setting. The most common indications were evaluation of dysphagia, screening for complications of laryngopharyngeal reflux, and as part of panendoscopy for cancer patients. Nearly 70% of respondents were either primarily responsible or have a shared responsibility with gastroenterology for foreign body management at their institution. Eighty four percent use the rigid esophagoscope alone for this purpose. More than three quarters of otolaryngology residency programs currently include flexible esophagoscopy in their training which is performed equally in the operating room and the office; most favor rigid esophagoscopy for foreign body retrieval.

Conclusions: There has been a rapid increase in the use of flexible esophagoscopy by otolaryngologists. The majority of residency programs currently include flexible esophagoscopy in their training. Otolaryngologists play a major role in esophageal foreign body management and use the rigid esophagoscope for this purpose.

1-014

THE EFFECT OF MANDIBULAR TORI ON GLOTTIC EXPOSURE DURING SUSPENSION MICROLARYNGOSCOPY

Simon Best, MD
Anca M. Barbu, MD
James Burns, MD
Aaron Friedman, MD
Gerardo Lopez-Guerra, MD
James Kobler, MD
Steven Zeitels, MD
BOSTON, MA

Objectives: Mandibular tori have been identified as a contributing factor for difficult exposure during intubation. However, no investigation has measured the effect of mandibular tori on glottic exposure during suspension microlaryngoscopy (SML). The objective of this study was to build a simulation model to evaluate how mandibular tori affect glottic exposure during SML at different thyromental distances.

Methods: Suspension microlaryngoscopy was modeled using an anatomically-accurate skull and larynx with thyromental distances between 6-12cm. Mandibular tori were created by inwardly protruding screws 5-15mm from the lingual mandible. Simulated tori were positioned either 15mm (anterior) or 25mm (ior) from midline of the symphysis. Glottic exposure for various-sized tori in each location was measured by recording maximum displacement of the glottiscope tip. The glottiscope angle relative to the horizontal plane was also measured.

Results: Mandibular tori >10mm had a significant impact on glottic exposure. Displacement of the glottiscope tip ranged from 2-9mm for anteriorly-placed tori and 7-29mm for iorly-placed tori, with larger tori causing greater displacement. Increasing the thyromental distance increased ior glottiscope tip displacement regardless of torus size or location. Glottiscope angle increased with larger tori (12°-28°), but this angle did not change with increasing thyromental distance.

Conclusions: The contour and thickness of the lingual mandible inner-table can be key anatomic restrictions for optimal microlaryngoscopic glottic exposure. This model effectively demonstrates how larger sized and inferiorly-located mandibular tori significantly reduce anterior glottic exposure. This study highlights why a careful floor-of-mouth exam should be done on all patients planned for microlaryngoscopy.

1-015

INTERSPECIES COMPARISON OF VITAMIN A-STORING VOCAL FOLD STELLATE CELLS

Yutaka Toya, MD

Diane Bless, MD

Christopher Davis, MD

Yo Kishimoto, MD

Napaorn Riabroy, MD

Sherry Tanumihardjo, MD

Yo Kishimoto, MD

Nathan Welham, MD

MADISON, WI

Purpose: Previous reports described a vocal fold stellate cell (VFSC) population in human vocal fold mucosa. These cells, localized to the macula flavae (MF), appear to be a local repository of vitamin A; their exact role in vocal fold biology is unclear and cannot be determined from human studies. Experimental research in this area would benefit from a suitable animal model; therefore, we pursued interspecies comparisons to identify the most appropriate model for future in vivo experimental VFSC research.

Design and Method: We conducted hematoxylin and eosin (H&E; general morphology), oil red O (OR; lipid droplet), and gold chloride (GC; vitamin A) staining of serial frozen vocal fold (VF) sections from five species: human, dog, pig, rabbit and rat (n = 2-3 per species). We immunostained sections for the stellate cell marker GFAP. Finally, we performed HPLC-based analysis to obtain retinol and retinyl ester profiles.

Summary of Results: Human and rat VF mucosa exhibited a clear subpopulation of OR+ GC+ GFAP+ cells within the anterior and/or MF. HPLC analysis confirmed the presence of retinol and retinyl esters in humans and rats. However, VFSCs and MF were not identified in dog, pig and rabbit specimens.

Conclusions: Our data indicate that rat VFSC and MF are most similar to human, suggesting the rat model is best suited to in vivo experimental VFSC research.

1-016

GIANT CELL TUMOR OF THE LARYNX

Brittany Howard, MD

Michael Hinni, MD

PHOENIX, AZ

Purpose: Giant cell tumors are benign locally aggressive tumors primarily affecting long bones with rare reports of laryngeal involvement. We present a laryngeal giant cell tumor successfully managed by conservative surgical techniques and a review of the literature.

Design: Retrospective chart review and review of the literature

Results: A 40 year old male presented with symptoms of progressive airway obstruction requiring tracheostomy at an outside institution. Computerized tomography demonstrated a destructive, expansible mass involving the left ior cricoid. Biopsy revealed spindle and polygonal cell proliferation, admixed with multinucleated giant cells consistent with a diagnosis of giant cell tumor. The tumor was resected by vertical hemilaryngectomy without complication. At 4 months follow-up the patient is decannulated with a functional voice and has no evidence of recurrent disease. Review of the literature identified 32 prior reports of laryngeal giant cell tumors; including a second from this institution. Average age is 41 years (range 23-62) with a 10:1 male to female ratio. Tumors are reported to originate from the thyroid cartilage (67%), cricoid cartilage (24%), epiglottis (6%), and laryngeal soft tissue (3%). Treatment modalities described include surgical resection (75%), radiation therapy (13%), and surgery with adjuvant irradiation (13%). With mean follow-up of 5.9 years (range 0.25-24.9 years) there are no reports of tumor recurrence.

Conclusions: Laryngeal giant cell tumors most commonly present in males with symptoms of airway obstruction. Independent of treatment modality the prognosis is favorable with no reports of tumor recurrence or sarcomatous transformation.

1-017

SIMULATION MODEL FOR TRACHEOTOMY EDUCATION FOR PRIMARY CARE PROVIDERS

Leighanne Dorton, MD

Adele Evans, MD

Catherine R. Lintzenich, MD

WINSTON-SALEM, NC

Purpose: Evaluate the competency of primary care providers in managing patients with tracheotomies and assess the need for, and efficacy of, a formal multi-disciplinary educational program using patient simulation.

Design: Prospective observational study of 81 subjects including anesthesia and emergency medicine residents, pulmonary fellows, ICU nurse practitioners and nurses who manage patients with tracheotomies daily within a tertiary care hospital. Self-assessment questionnaires and objective multiple choice tests were completed by participants before and after attending a comprehensive educational course using patient simulation. Outcome measurements include scores of questionnaires and tests, which were analyzed using paired two-tailed t-tests, as well observational data collected during recorded patient simulation sessions.

Results: Before education and simulation, participants reported an average comfort level of 3.3 on a 5-point Likert-scale across 10 categories in the questionnaire, which improved to 4.4 after the module ($p < 0.0001$). Participants scores improved from mean 55% on the pre-test to 88% on the post-test ($p < 0.0001$). Deficiencies observed during simulation laboratory sessions included unfamiliarity with tracheotomy tube types and parts, inability to check and adjust cuff pressure, misunderstanding of speaking valve physiology, and delayed recognition and treatment of a plugged or dislodged tracheotomy tube.

Conclusions: There is a significant need for improved tracheotomy education amongst primary health care providers. Patient simulation was effective at improving comfort, increasing basic knowledge, and teaching skills necessary to manage patients with a tracheotomy.

1-018

EMERGENT TREATMENT OF BUTTON BATTERIES IN THE ESOPHAGUS – EVOLUTION OF MANAGEMENT AND PEARLS

Douglas Ruhl, MD
Benjamin Cable, MD
HONOLULU, HI

Purpose: The epidemiology of the growing outbreak of pediatric button battery ingestion has been well established. Several ideas regarding the mechanism of injury exist. Currently, assessing the degree of damage relies heavily on initial esophagoscopy when removing the battery. We will present several cases treated at our hospital and discuss recent literature with an emphasis on transitioning research toward the management of these patients.

Method: Case series and literature review.

Results: Five patients (ages 11 – 18 months) with button batteries trapped in their cervical esophagus were recently managed at our institution. The duration of batteries lodged in the esophagus ranged from 6 hours to 4 months. One child developed a severe stricture and required proximal esophagectomy. However, three cases with initial grade III circumferential necrotic injury were downgraded after a second esophagoscopy 2-4 days after removal.

Conclusions: The injury and healing of button batteries in the proximal esophagus appears to be variable. Button batteries are a unique entity separate from caustic injury. A distinct endoscopic grading scale may be reasonable. Obtaining a close second-look esophagoscopy 2-4 days after battery ingestion may provide more useful prognostic information. In certain cases, the injury may be downgraded which would facilitate an earlier return to an oral diet, fewer diagnostic tests and a shorter hospital stay. The utility and timing of imaging, management of diet and medications, and acceptable follow-up plans will be discussed within the context of guiding future research.

1-019

LARYNGEAL SCHWANNOMA: A CASE SERIES AND LITERATURE REVIEW

Jonathan Romak, MD

Dale Ekbohm, MD

ROCHESTER, MN

Purpose: Schwannomas of the larynx are extremely rare, with presentation ranging from incidental findings in asymptomatic patients to life threatening airway obstruction. The literature on such tumors is dominated by individual case reports. This study presents the experience of a single institution with laryngeal schwannomas over a 26-year period.

Design and method of study and analysis: Our institution's pathologic database was reviewed between 1985 and 2011. Three cases of laryngeal schwannoma were identified.

Summary of Results: Primary tumor sites were on the epiglottis, the pyriform sinus, and the false vocal fold. Treatments consisted of observation or transoral CO2 laser excision. Treatment lead to symptomatic improvement.

Conclusion: Schwannoma of the larynx, although rare, should be considered in the differential diagnosis of a laryngeal mass. These tumors may arise from various sites within the larynx, and are amenable to surgical excision when symptomatic.

1-020

OFFICE-BASED TRACHEOESOPHAGEAL PUNCTURE: UPDATES IN TECHNIQUES AND OUTCOMES

Jennifer Bergeron, MD

Dinesh Chhetri, MD

Andrew Erman, MD

Nausheen Jamal, MD

LOS ANGELES, CA

Introduction: Tracheoesophageal Puncture (TEP) is an effective rehabilitation method for postlaryngectomy speech and has already been described as a procedure that is safely performed in the office. Previously, patients who had undergone rotational flap or free flap reconstruction at the time of laryngectomy were excluded from the office-based technique. We review our experience with office-based TEP over the past seven years including those patients status flap reconstruction.

Methods: A retrospective chart review was performed of all patients who underwent TEP by a single surgeon from 2005 through 2012 including office-based and operating room procedures. Patient characteristics, including presence or absence of prior rotational or free flap, as well as indication for the location of the procedure (operating room versus clinic), were recorded.

Results: 62 patients underwent 73 TEP procedures with 56 performed in the outpatient setting and 17 performed in the operating room. Of the outpatient TEPs, 20 were on patients with prior rotational or free flap reconstruction with successful speech outcomes. The indications for performing TEPs in the operating room included 2 primary TEPs, 13 due to concomitant procedures requiring general anesthesia, 1 due to free flap only, and 1 due to failed attempt at office-based TEP.

Conclusions: TEP in an office-based setting continues to be a safe method of voice rehabilitation for post-laryngectomy patients, including those who have previously undergone free flap or rotational flap reconstruction.

1-021

CHRONIC CERVICAL ESOPHAGEAL FOREIGN BODIES IN CHILDREN

Jordan Schramm, MD

Shahab Abdessalam, MD

Kenneth Azarow, MD

Stephen Raynor, MD

Ryan Sewell, MD

OMAHA, NE

Purpose: To present our experience with chronic cervical esophageal foreign bodies in the pediatric population.

Study Design: Case series with review of the literature.

Results: Three cases of chronic cervical esophageal foreign bodies in pediatric patients are presented. In each case, the patient presented primarily with respiratory symptoms. Patient ages were 4.5 years, 13 months, and 16 months. Time of foreign body retention prior to removal was 3 weeks, 11 months, and 10 months, respectively. The first patient had a failed attempt at endoscopic removal. The second patient had a foreign body with sharp edges which were lodged into the wall of the esophagus. The third patient had complete migration of the foreign body into the wall of the esophagus. All patients underwent open neck exploration with removal of the foreign body. Complications included esophageal stricture in the first patient, requiring subsequent dilatation; no complications in the second patient; left true vocal fold paresis, which resolved spontaneously, and tracheoesophageal fistula, with subsequent successful endoscopic closure, in the third patient. None have experienced long-term sequelae.

Conclusions: Chronic esophageal foreign body should be included in the differential diagnosis for respiratory distress in children. A high index of suspicion is required to recognize this problem. While endoscopic management remains first line and is usually successful, some patients may require open surgical removal. In our experience with chronic pediatric cervical esophageal foreign bodies, neck exploration with removal of the

foreign body is safe and effective when endoscopic management fails or is not possible because of transmural foreign body migration.

1-022

IMPACT OF SCARRED PHENOTYPE ON THE EXPRESSION OF CRITICAL EXTRACELLULAR MATRIX GENES IN VOCAL FOLD FIBROBLASTS

Aaron Kosinski, MD

Alyssa Panitch, MD

M. Preeti Sivasankar, MD

WEST LAFAYETTE, IN

Purpose: To elucidate the impact of scarring on the expression of 6 extracellular matrix genes that are critical to the production of vocal fold tissue by fibroblasts. This knowledge will allow the development of in vitro tissue engineered models that mimic both healthy and scarred phenotypes. Such platforms will allow us to study both phenotypical changes, and also provide a means to test and identify functional therapeutics.

Methods: Immortalized human vocal fold fibroblasts (I-HVFF) were grown on glass substrates to 50-60% confluency. I-HVFFs on half the substrates were then induced into a scarred phenotype using transforming growth factor beta 1 (TGF- β 1) while the other half were maintained in an unscarred phenotype. After allowing the scarred and unscarred I-HVFFs to grow for ~10 days, quantitative PCR was conducted in order to assess the up or down regulation of extracellular matrix genes including elastin, collagen type 3 alpha 1 (COL3A1), collagen type 1 alpha 2 (COL1A2), decorin, hyaluronan synthase 2 (HAS2), and fibronectin.

Results: I-HVFFs expressing a scarred phenotype showed an up regulation in elastin, COL3A1, COL1A2, and fibronectin gene expression. Conversely, decorin and HAS2 gene expression were down regulated.

Conclusions: The scarred phenotype has a significant impact on the expression of all 6 extracellular matrix genes. Decorin, which helps organize collagen into thin fibers, was slightly down regulated. This decrease in decorin expression in addition to the increase in collagen expression may be contributing to the undesirable formation of thick collagen fibers in vocal fold scar tissue.

1-023

DEVELOPMENT OF NEW TRACHEAL PROSTHESIS FOR REPAIR OF A PARTIAL TRACHEAL DEFECT: TRIPLE LAYERED POLYURETHANE SCAFFOLD WITH WRINKLES ON THE SURFACE

Han su Kim, MD
Hong-Shik Cho, MD
Hae Sang Park, MD
SEOUL, SOUTH KOREA

Ja Hyun Lee, MD
GOYANG, KOREA

Jin Ho Lee, MD
Jin Rae Kim, MD
DAEJEON, SOUTH KOREA

Se Heang Oh, MD
CHEONAN, SOUTH KOREA

Purpose of the study: Partial tracheal defects are commonly faced problems. The purpose of this study is to develop an artificial prosthesis for reconstruction of a partial tracheal defect.

Method: A triple layered scaffold was made from polyurethane (PU). The inner and outer layer consists of asymmetric porous PU. The middle layer was made up of nonporous PU film with wrinkles to increase durability and flexibility. Polyethylene glycol was grafted onto inner surface of PU scaffold for promotion of regrowth epithelium and prevention of formation of crust. The scaffolds were transplanted into 12 New Zealand rabbit after making a window (size 1 X 1 cm). Endoscopic and histological examinations were performed on 3, 6, 9, 12, 15 and 18 week. Mechanical properties of scaffold transplanted area were compared with normal site. Cilia beat frequency (CBF) was checked using high speed camera.

Result: The thickness of scaffold was 1.5mm and the pore size of porous part was 200um. Maximum flexural stress was excellent compared to the non-wrinkle scaffold(1.03 ± 0.19 vs

0.56 ± 0.09). Endoscopic findings revealed circular framework of the tracheal lumen was well maintained. Inflammatory cells were noted in 6 week specimens. However the degree of inflammation was decreased after 9 weeks. Re-epithelialization was noted in 3 weeks and it completed in 9 weeks. CBF of re-epithelialized mucosa was 15-18 Hz (normal range: 15-20 Hz).

Conclusion: The wrinkle shape triple layered PU scaffold could be used as a ready-made type prosthesis for reconstruction of a partial tracheal defect.

1-024

CASE REPORT: A CHUCK-E-CHEESE TOKEN MIMICKING AN ESOPHAGEAL BUTTON BATTERY

Andres Bur, MD

Luv Javia, MD

Pamela Mudd, MD

PHILADELPHIA, PA

Case report: A healthy 5 year old male presented to the emergency department at midnight after ingesting a metal object three hours prior. According to the boy's father, he had been playing with several coins earlier in the evening. His parents had not witnessed him swallow the object and there was no history of choking, drooling or respiratory distress. When the child confessed to his father what he had done, he was brought to the ER for further evaluation. On exam, the patient was stable and in no distress. Chest x-ray (figure 1) showed a radio-opaque foreign body in the proximal esophagus at the level of the thoracic inlet. The object demonstrated a halo sign, or double rimmed appearance, on AP chest x-ray as is often seen with button batteries. However, on the lateral radiograph, there was no step-off as is seen between the anode and cathode in most button batteries. 1) It was also noted that there was an inscription on the object, however the text was not legible and was not useful in identifying the foreign body. After reviewing the case with radiology, it was determined that although the foreign body was likely an unusual coin, the possibility remained that the child had swallowed a button battery. Though the operating room was short staffed and the child had a full stomach, he was taken emergently for esophagoscopy and foreign body removal. After induction with general anesthesia, a rigid esophagoscope was passed to the level of the proximal esophagus where a metallic object was seen and easily removed with an optical forceps. The foreign body was found to be a token from the popular children's entertainment center, Chuck E. Cheese (figure 3). The esophageal mucosa distal to and at the level of the foreign body was then examined and found to be healthy and intact. The patient was extubated and transferred to the PACU in stable condition. He was discharged to home later that morning without post-operative complications.

Discussion: Foreign body ingestion is a common clinical entity encountered by pediatric otolaryngologists with coins being the most common foreign body seen. In a 1995 cross-sectional survey of more than 1500 parents, 4% of children had swallowed a coin. 2) Pediatric button battery ingestion, although less common, represents a major public health hazard and may result in serious complications including tracheoesophageal fistula, vocal cord paralysis and esophageal perforation. The incidence has increased in recent years owing to growing use of button batteries in household items including greeting cards. 3) Distinguishing coin and button battery ingestion represents a significant challenge for clinicians and radiologists alike. In the case of an unwitnessed ingestion or unclear clinical history, diagnosis of an esophageal button battery relies heavily on the radiographic characteristics of the foreign body as discussed previously. On close inspection, the Chuck E. Cheese (CEC) token has a double-rimmed appearance, one of the key radiographic features that distinguish batteries and coins. Had it been possible to establish that the foreign body in this case was a coin and not a battery, the patient would have been taken electively to the operating room the following morning with exposure to less peri-operative risk.

Conclusions: In this report, we presented an unusual case of an esophageal foreign body where radiography was unable to clearly distinguish a coin from a button battery. The result was that a patient who would otherwise have undergone an elective procedure was taken emergently to the operating room. A letter was written to CEC Entertainment describing the case and recommending a change in their token design to be more easily distinguishable from button batteries on radiography. Their response is pending.

1-025

ROBOTIC-ASSISTED ENDOSCOPIC REPAIR OF PEDIATRIC TYPE III LARYNGEAL CLEFT

Christopher Thompson, MD

Abie Mendelsohn, MD

Nina Shapiro, MD

LOS ANGELES, CA

Purpose: Laryngeal clefts are rare congenital abnormalities with an incidence of 1:10,000-20,000 births. Endoscopic repair has been recommended for type I or II clefts, while open repair has been reserved for more advanced type III or IV clefts. A single case series has previously reported successful robotic-assisted surgical closure for types I and II. We present our experience with the first reported case of a robotic-assisted endoscopic repair of type III laryngeal cleft in a pediatric patient.

Design: Case report.

Methods: We present a 5 year-old male with type III laryngeal cleft, who had been tracheostomy and gastrostomy tube dependent since age 3 weeks. Preoperative microlaryngobronchoscopy confirmed a laryngeal cleft extending into the cervical trachea.

Results: Exposure of the larynx was obtained with a Crowe-Davis oral retractor. The Si da Vinci surgical robotic system with 8.5mm, 30-degree angled endoscope was utilized. With a dedicated robotic instrument adapter, flexible fiber CO2 laser delivery was used to ablate the internal mucosal surfaces of the cleft. Robotic instruments placed 5-0 Vicryl sutures to close the defect. Immediate postsurgical microlaryngobronchoscopy demonstrated complete closure. Postoperative airway and swallowing function will be discussed.

Conclusion: Robotic-assisted approach with combined flexible fiber CO2 laser delivery holds promise as an effective, minimally invasive, approach for selected laryngeal cleft repairs.

1-026

PH PROBE TESTING IN THE MANAGEMENT OF SUBJECTIVE LARYNGOPHARYNGEAL REFLUX SYMPTOMS: REVIEW OF 244 PATIENTS

Jonathan Bock, MD

John Petronovich, MD

Robert Toohill, MD

Joel Blumin, MD

MILWAUKEE, WI

Purpose: We present our combined experience with objective dual-pH probe testing in the management of 244 patients with LPR symptoms in a tertiary laryngology practice managed over 8 years.

Design: Retrospective chart review

Results: Two hundred forty-four studies were performed between the years 2004-2012 by three different physicians. 200 of these were standard 24-hour dual pH probe studies (2004-10), and 44 were 24-hour dual pH multichannel intraluminal impedance (pH-MII) studies (2010-12). All studies were performed for LPR symptoms including cough, throat clearing, dysphonia, and globus sensation. 4 studies were either aborted due to patient intolerance or found to have invalid data on interpretation (1.6%). There were no significant complications from pH probe placement. Overall rate of LPR-positive interpretation was similar between dual pH and pH-MII studies. 51.2% of all studies were interpreted as positive for evidence of significant LPR, 32.8% were interpreted as negative, and 16% were equivocal. There was significant variability in the rate of positive interpretation between individual physicians, and a lower averaged overall DeMeester score in pH-MII studies compared to dual pH probes. 16 of these patients eventually went on to fundoplication (6.6%).

Conclusion: In one of the largest series ever published on dual pH probe use in management of LPR symptoms by an otolaryngology group, over 50% of patients with symptoms of LPR demonstrated objective evidence of LPR on pH probe testing. Overall rate of positive interpretation did not vary between dual pH or pH-MIII studies, although it did between practitioners.

1-027

TWO-INSTRUMENT TECHNIQUE FOR REMOVAL OF IMPACTED HAIR CLIP FROM ESOPHAGUS

Jennifer Brinkmeier, MD

Marci Lesperance, MD

ANN ARBOR, MI

Purpose: To describe a novel technique for foreign body removal.

Case Report: A 20-year-old nonverbal female with static encephalopathy presented to an outside hospital after she was found unresponsive following an episode of gagging and coughing. Family reported several weeks of increasing dysphagia prior to admission. On transfer to the pediatric intensive care unit, she was intubated for hypercarbic respiratory failure, left lower lobe pneumonia, and altered mental status. She was extubated the next day, and two days later underwent videofluoroscopic swallow study to evaluate persistent dysphagia. Findings were remarkable for a metallic coil in the esophagus at the thoracic inlet. The Otolaryngology service performed direct laryngoscopy, bronchoscopy, and rigid esophagoscopy under general anesthesia, identifying a large plastic jaw-style hair clip (size 2x3 cm) in the esophagus, with impacted food debris. A suspension laryngoscope was placed within the esophagus to accommodate the simultaneous use of two instruments to gently dislodge the impacted food debris and hair clip from the esophageal walls. Postoperative esophagram demonstrated no leak. Retrospective review of the initial CXR revealed the foreign body overlying C7, in close proximity to spinal hardware. Parents reported that the patient had a habit of chewing on hairclips.

Conclusions: This case illustrates the importance of comparison to old films to identify foreign bodies in patients who have had surgical implants such as spinal hardware. The patient's developmental delay and nonverbal status also contributed to delay in diagnosis. The duration and large size of the foreign body led to accumulated food debris and marked inflammation, but these challenges were overcome by using a suspension laryngoscope.

1-028

INVASIVE FUNGAL LARYNGOPHARYNGITIS RESULTING IN AUTO LARYNGECTOMY

Sergio Cervantes, MD

Michael Hinni, MD

April Landry, MD

David Lott, MD

PHOENIX, AZ

Tyler Swiss, MD

GLENDALE, AZ

Purpose: As the treatment of hematopoietic cancers evolves, otolaryngologists will treat a higher incidence of opportunistic infections. Advanced chemotherapy regimens may eradicate disease, but it also diminishes the immune system. We review a case of invasive fungal disease invading the pharynx, larynx, trachea and pulmonary parenchyma following chemotherapy.

Design/Method/ Analysis: We report a case of invasive fungal disease which developed after chemotherapy treatment for Myelodysplastic Syndrome (MDS) and Acute Myeloid Leukemia (AML). We review the literature concerning invasive fungal laryngitis and compare our case with reported cases.

Summary: We encountered a 46 year old female one week after induction chemotherapy for treatment of MDS and AML. Initial symptoms were odynophagia and dysphagia, and despite a reassuring physical exam the patient rapidly declined. Within the next month the patient would require urgent tracheotomy and six further operations to address spreading infection, cavity formation and tissue necrosis. Because of her inability to heal, the patient was not a candidate for laryngectomy, thus she was treated conservatively with medication and wound care. The patient was lost to follow up for five months, but on return the airway had separated and the laryngeal structure had almost completely dissolved, which facilitated full respiratory and oral feeding function.

Conclusions: While non-invasive fungal laryngitis is routinely encountered, its invasive counterpart is rare. The literature demonstrates cases completely reversed with medical therapy alone, however surgery may be necessary. We recommend surgical debridement of all diseased, nonviable tissue.

1-029

CLINICAL PRESENTATION OF SUBGLOTTIC STENOSIS IN PATIENTS WITH GRANULOMATOSIS WITH POLYANGIITIS (WEGENER'S GRANULOMATOSIS)

Elizabeth Guardiani, MD

Faiz Bhora, MD

Andrew Blitzer, MD

Robert Lebovics, MD

Jonathan Lesser, MD

Hassan S. Moghaddas, MD

Franco Resta-Flarer, MD

Monica Rodriguez-Valero, MD

NEW YORK, NY

Purpose of study: To describe the presentation and clinical characteristics of patients with Granulomatosis with Polyangiitis (GPA) and subglottic stenosis (SGS).

Design and Method: A retrospective review of all patients presenting to our institution from 2000 to 2012 with clinically significant subglottic stenosis (defined as requiring operative airway intervention) and a compelling diagnosis of GPA was performed. Clinical history, physical exam findings and laboratory studies were reviewed. Patients with incomplete medical records were excluded. Results: Thirty-six patients with GPA and SGS were identified. The average age at diagnosis was 33 years old. Diagnosis was made by tissue biopsy in seven patients, ANCA serologies in nine patients and a combination of both in 20 patients. Thirteen patients (36%) presented with SGS as part their initial manifestation of GPA. The remaining patients developed SGS later, at a median of three years from diagnosis (range six months to 14 years). Eight patients (22%) had documentation of vocal cord fixation at some point during their disease course. Seven patients (19%) had mid/distal tracheal stenosis and five (14%) had bronchial stenosis. The majority of patients (86%) had evidence of concurrent sinonasal involvement, ten patients (28%) had evidence of otologic involvement and nine (25%) had ocular involvement.

Conclusions: Although one-third of patients with GPA who develop SGS will have it at presentation, the majority develop SGS later in the disease course over a highly variable time interval. Patients with SGS typically have other head and neck manifestations of GPA, most commonly sinonasal.

1-030

DIFFERENTIATING COMMON SYMPTOMS OF LARYNGOPHARYNGEAL REFLUX FROM GLOTTIC INSUFFICIENCY IN THE VOCAL FOLD ATROPHY POPULATION

Anju Patel, MD

Thomas Carroll, MD

William Kim, MD

Nicholas Mildenhall, MD

BOSTON, MA

Purpose of the study: To determine in the true vocal fold atrophy (atrophy) population if the common symptoms of throat clearing and mucus sensation, often attributed to laryngopharyngeal reflux (LPR), are due to underlying glottic insufficiency (GI). Is the atrophy population being prescribed proton pump inhibitors unnecessarily?

Design and method of study and analysis: A retrospective review of all patients with atrophy but no other significant underlying laryngeal pathology seen at a tertiary voice center from July 2009 to May 2012 was conducted. Patient demographics, symptoms, LPR diagnosis, interventions, pre-intervention and post-intervention voice handicap index-10 (VHI) and reflux symptom index (RSI) were recorded.

Summary of results: 26 patients (44% male) met inclusion criteria. Mean age was 67 years. 85% of patients were initially treated for LPR. Throat clearing and mucus production were common complaints (85%). Dysphonia (54%) and globus sensation (46%) were also recorded. Interventions included LPR medical management (65%), vocal fold augmentation (23%), and voice therapy (12%). RSI improved in all groups. VHI and RSI both normalized in the patients treated with augmentation. Globus was not a complaint in those patients who responded to augmentation.

Conclusions: Certain symptoms overlap in patients with atrophy and LPR while others may help distinguish between the two pathologies. Throat clearing and mucus sensation in the atrophy population may not be due to LPR only but rather a reflection of underlying GI. Consideration to symptom presentation and risk vs. benefit of treatment options warrants further study in the aging voice population.

1-031

NEW AERODYNAMIC DATA IN VOICE EXERCISES WITH A SEMI-OCCLUDED TRACT

Antoine Giovanni, MD

Camille Robieux, MD

MARSEILLE, FRANCE

Introduction: Phonation exercises using semi-occluded tract (straws, tubes) are often used in voice therapy but data are missing about aerodynamic measurements and mainly about actual subglottal pressure during exercises. Our aim was to collect and compare data in two different types of exercises: 1- phonation with the consign of maintaining a constant airflow called PCA (following the technique proposed by Lax Vox® and others) and 2- phonation with facial resonances called PFR (following the technique proposed by Titze and others)

Method: Four control subjects (2 males and 2 females) were studied. They were asked to sustain a phonation in two straws (respectively 2mm and 5 mm diameter) at different tones of their range using the two above mentioned methods. Glottal vibration was checked by EGG. Intra-oral, subglottal pressure and airflow were measured as well as acoustic data (Int, Fo) were collected

Results: Results confirm that in all subjects, in PCA, glottal pressure gradient remained constant approximately at the level of PTP measured (PTP 3.7; 2mm 4.2; 5mm 4.1). In PFR, glottal gradient was higher but significantly lower than expected considering the intensity

Discussion: Our results confirm significant differences (almost opposite) between the two methods of using straw in voice therapy: phonation at the threshold for PCA and decrease of the transglottal gradient thanks to resonance in PFR. The next step will be to better standardize use of this reeducative tool according to the physiopathology of the specific case (hyper or hypofunctional).

1-032

IDIOPATHIC SUBGLOTTIC AND TRACHEAL STENOSIS: A SURVEY OF THE PATIENT EXPERIENCE

Sharon Gnagi, MD
Brittany Howard, MD
David Lott, MD
PHOENIX, AZ

Purpose of the Study: To report and compare patients' experiences with acquired subglottic stenosis (AS) versus idiopathic subglottic and tracheal stenosis (ISTS).

Design and method of study and analysis: A patient-designed survey was made available to patients with AS and ISTS. Results were analyzed for inter- and intra-group differences.

Summary of Results: The study included 160 survey participants (AS n=28; ISTS n=132), with a predominance of female participants (82% AS, 98% ISTS). There were no significant differences in comorbid conditions, familial disease, or hormonal alteration. Acid reflux was the most prevalent comorbidity across groups (42-43%). Both groups had similar presentations with the most common symptoms being cough, shortness of breath, and increased secretions. A significant difference in time to diagnosis was found between groups with 32% of AS patients diagnosed within 3 months of symptom onset, compared to 2% with ISTS. A diagnosis delay greater than 18 months occurred for 58% of ISTS patients. There was no difference in treatment approach with the most common treatment being balloon dilation, followed by laser dilation. Tracheal resection was performed in 36% of patients. Patient satisfaction with surgical outcomes was significantly higher after tracheal resection (76%) compared to other treatment modalities (39%).

Conclusions: ISTS remains a diagnostic challenge as highlighted by the delay in diagnosis compared to AS. There appears to be no historical or symptomatic factors specific to ISTS. Additionally, patients report increased satisfaction and symptom resolution after tracheal resection. By incorporating patient feedback, we may more effectively diagnose and treat ISTS.

1-033

LATE TRACHEOTOMY IS ASSOCIATED WITH HIGHER MORTALITY AND MORBIDITY IN CRITICALLY ILL PATIENTS UNDERGOING MECHANICAL VENTILATION

Sapna Patel, MD
Albert Merati, MD
SEATTLE, WA

Emily Plowman, MD
TAMPA, FL

Stacey Halum, MD
INDIANAPOLIS, IN

Objectives: Tracheotomy is a commonly performed procedure. There is no general consensus regarding optimal timing for tracheotomy in critically ill patients undergoing prolonged mechanical ventilation. The aim of this study was to determine the relationship between tracheotomy timing, ventilator wean status, and mortality rate in these patients.

Methods: A multi-institutional database of tracheotomy cases was analyzed with particular attention to critically ill patients whose indication for tracheotomy was ventilator dependence. A Chi-Square analysis, t-test and odds ratios were performed to determine if early (< 2 weeks) vs. late (≥ 2 weeks) tracheotomy was associated with 1) higher mortality and/or 2) ability to be weaned from mechanical ventilation at the completion of the follow up period.

Results: Seven hundred thirty-six critically ill patients were identified as having undergone tracheotomy for prolonged intubation with ventilator dependence. Patients who died in this cohort had a significantly longer time to tracheotomy [$t(2)=-2.39$, $p=0.02$] and individuals who underwent a late tracheotomy were 1.73 times more likely to be ventilator dependent (95% CI:1.12-2.66) and 1.4 times more likely to die (95% CI:0.96-1.99). 71.3% of patients who underwent a tracheotomy early (< 2 weeks) were weaned off the ventilator compared to 59% who had a late

tracheotomy (? 2 weeks). Patients with a late tracheotomy were more likely to remain ventilator dependent than those having tracheotomy early (41% vs 28.7%).

Conclusion: For ventilator dependent patients, late tracheotomy (>2 weeks) is associated with higher mortality and a lower likelihood of being weaned off mechanical ventilation.

1-034

SNORING DYNAMICS – ACOUSTIC CHANGES ACROSS SLEEP STAGES AND ANATOMIC PHENOTYPES IN PRIMARY SNORING AND OBSTRUCTIVE SLEEP APNEA

Gregory Dion, MD

Emily Chapa, MD

Ross Dodge, MD

Peter O'Connor, MD

SAN ANTONIO, TX

Purpose: Surgical management of obstructive sleep apnea (OSA) and primary snoring aims at altering airway anatomy to relieve symptoms. Snoring is a dynamic, acoustic reflection of shape and muscle tension within the oro-naso-pharyngeal airway. These palatal and pharyngeal muscles are often the targets of sleep surgery. While neuromuscular changes during sleep have been documented, it is not known how these changes alter snoring acoustics in various stages of sleep.

Methods: Prospective continuous acoustic recordings of 20 subjects undergoing polysomnography for evaluation of snoring and sleep disordered breathing between December 2011 and August 2012. All subjects also underwent nasopharyngoscopy. Times for different sleep stages were matched to audio recordings. Fundamental frequency, formant frequencies, and spectrograms of individual snores during each stage of sleep for patients with primary snoring or OSA were compared using a fast fourier transform algorithm.

Results: Of study subjects that snored, all subjects had acoustic pattern changes between stages of sleep with a variety of anatomical phenotypes. Snores during stage III sleep appeared most organized, with readily identifiable fundamental and formant frequencies. Stage II and rapid eye movement (REM) sleep were characterized by a more disorganized acoustic pattern with less obvious fundamental and formant frequencies.

Conclusions: This data correlates to studies illustrating muscle tone and motor unit action differences during sleep. Acoustic

changes between stages of sleep results from altered shape and dynamic tension of the oro-naso-pharyngeal musculature. These study findings indicate additional, functional exams for sleep-disordered breathing could help in evaluation and surgical planning.

1-035

ELECTRICAL STIMULATION WITH AN IMPLANTED ELECTRODE FOR VOCAL FOLD ADDUCTION IN UNILATERAL PARALYZED LARYNX

Kenichiro Nomura, MD

Yasuaki Harabuchi, MD

Akihiro Katada, MD

Isamu Kunibe, MD

ASAHIKAWA, JAPAN

Purpose: The aim of this study was to create a suitable electrode, and to examine the feasibility of unilateral stimulation to produce vocal fold adduction in unilateral paralyzed larynx.

Methods: Four canines were used in this study, and divided into denervated group and reinnervated group by recurrent laryngeal nerve (RLN) section or neurotomy. An electrode array consisted of 8 active platinum disk electrodes, mounted on a 10 x 8 x 1 mm silicone plate. Each of the 8 electrodes was 1 mm in diameter. This electrode array was implanted into a thyroplasty window to stimulate the thyroarytenoid (TA) muscle. Stimulus frequency was fixed at 40 Hz and pulse duration was used 0.5 or 1msec. Vocal fold angle from anterior commissure to vocal process resulting from TA stimulation was measured endoscopically in the anesthetized animal. First we examined two innervated canines and confirmed that this new created electrode array could produce appropriate glottal closure. Then RLNs were sectioned, or sectioned and repaired. Each endoscopic session with a chronic animal model was conducted four months after paralysis.

Results: In the denervated group TA stimulation could produce nominal glottal closure with high current. On the other hand in the reinnervated group TA stimulation could produce optimal glottal closure with low current. With respect to the location of eight disk electrodes, glottal angles resulting from disk electrodes were more proper than those from anterior electrodes.

Summary: This study demonstrated that TA stimulation with new created electrode could produce optimal glottal closure. However, reinnervation was desired for optimal glottal closure.

1-036

SHORT AND LONG TERM OUTCOMES AFTER SILASTIC MEDIALIZATION LARYNGOPLASTY: ARE ARYTENOID PROCEDURES NEEDED?

Michael Benninger, MD

Nauman Manzoor, MD

CLEVELAND, OH

James Ruda, MD

COLUMBUS, OH

Purpose: To evaluate short and long term vocal outcomes after medialization laryngoplasty (ML) utilizing a Silastic implant in patients with unilateral vocal fold paralysis (UVFP).

Design and methods: Prospective study of consecutive patients undergoing medialization laryngoplasty (ML) for UVFP from 2008-2010. Pre and post treatment MPT (Maximum phonation time) and VHI (Voice Handicap Index) scores were compared to assess the impact of ML on these outcomes. Patients with high vagal lesions or lateralized vocal folds (very low MPT) were compared to the entire group and the literature.

Summary: 102 patients with UVFP underwent ML. 38 patients were excluded as they either had a gortex implant (8) or the primary case was a revision (26). 68 patients were included. Pretreatment mean VHI (total score) was 65 for the entire cohort. Post operative VHI score was significantly lower both in short-term (3-8 weeks) follow-up, mean score 28 (paired t-test, $p < 0.05$) and in long term follow-up (9-12 months), mean score 23 ($p < 0.05$). MPT was significantly improved from mean 8.7 (median, 6.9) pre-treatment to 24.5 at short-term follow-up ($p < 0.05$) and to 25.2 long-term follow-up ($p < 0.05$). There were no significant differences between entire cohort and patients with a lateralized vocal fold or high vagal lesion. Better or comparable results were present when compared to literature using similar metrics for patients undergoing an arytenoid procedure with/without medialization.

Conclusions: Silastic ML significantly improves vocal outcomes in patients with UVFP both at short and long term follow up and are comparable (or better) than reported arytenoid procedures.

1-037

PREVALENCE OF POSITIVE LABORATORY FINDINGS IN NEWLY DIAGNOSED SUBGLOTTIC STENOSIS PATIENTS

Clint Allen, MD

Jerry Lee, MD

Albert Merati, MD

SEATTLE, WA

Objectives: Airway stenosis continues to be a dominant clinical problem in laryngology. The underlying etiology of many cases remains elusive. The aim of this investigation was to characterize laboratory (serum and histopathology) testing practices in a large referral laryngology practice and report on the prevalence of positive laboratory findings.

Methods: Retrospective review, tertiary laryngology practice

Results: Over the 5 year study period, 54 newly diagnosed subglottic stenosis (SGS) patients presented to the University of Washington Laryngology Clinic. None of these patients had any history suspicious for traumatic or prolonged intubation. Fifty-two of the 54 were female; the mean age was 51 years. Only 24/54 underwent laboratory analysis for autoimmune disease prior to surgical treatment. Three of the 24 patients (12%) had laboratory results indicating the presence of underlying autoimmune disease: 2 patients were found to be anti-neutrophil cytoplasmic antibody positive supporting the diagnosis of granulomatosis with polyangiitis, and one patient demonstrated abnormal IgG subgroup analysis supporting the diagnosis of IgG4-related disease. 29/54 underwent tissue biopsy at the time of surgery; histopathologic analysis was not different between patients with and without serologic evidence of underlying autoimmune disease.

Conclusions: Laboratory testing was not uniformly applied in this patient population; when testing was pursued, diagnosis of underlying autoimmune disease was seen in 12% of SGS patients at the time of their initial presentation. The clinical significance of the lack of consistent testing and the impact of positive serological findings is not known.

1-038

OUTCOMES OF SURGICAL TREATMENT OF SUBGLOTTIC STENOSIS (SGS) IN GRANULOMATOSIS WITH POLYANGITIS (WEGENER'S GRANULOMATOSIS): A REVIEW OF 48 PATIENTS

Elizabeth Guardiani, MD

Faiz Bhora, MD

Andrew Blitzer, MD

Robert Lebovics, MD

Jonathan Lesser, MD

Hassan S. Moghaddas, MD

Sadiq Rehmani, MD

Franco Resta-Flarer, MD

NEW YORK, NY

Purpose: To evaluate the safety and clinical outcomes of endoscopic repair in a cohort of patients with Granulomatosis with Polyangitis (GPA) and SGS.

Methods: We reviewed all patients that over a 12-year period presented with GPA and SGS who underwent SGS repair. Techniques used included use of micro-scissors with micro-flaps, rigid dilation and balloon tracheoplasty in conjunction with topical mitomycin-C and long-acting corticosteroid injections. General anesthesia with total intravenous anesthetic (remifentanyl, propofol and non-depolarizing muscle relaxant) and jet ventilation was utilized. Patient demographics, preoperative characteristics and disease severity were noted. End-points included average number of procedures, average time between procedures, postoperative complications and success with decannulation. Results Forty-eight patients underwent a total of 210 procedures. Mean number of procedures per patient was 4.6 and average time between procedures was 306 days (SEM +/- 29). Twenty-one patients received a tracheotomy as a consequence of their disease. Sixteen (76%) patients were successfully decannulated as a result of surgery. All patients improved symptomatically

post repair. Average airway diameter at the narrowest point was 4.2 +/- 0.2 mm preoperatively and 6.0 +/- 0.3 mm postoperatively at a 3-6 month follow up. Complication occurred in 2 patients (subcutaneous emphysema and reintubation post procedure due to laryngeal spasm).

Conclusion: Endoscopic surgical repair can be performed effectively and safely at experienced centers and is successful in achieving decannulation in a significant number of patients. In addition, it is possible to increase airway diameter and ameliorate respiratory insufficiency in this complicated group of patients.

1-039

OUTCOMES AND PATIENT SATISFACTION IN ENDOSCOPIC VERSUS OPEN REPAIR OF ZENKER'S DIVERTICULUM

Angela Tsai, MD

Hiran Fernando, MD

Gregory Grillone, MD

J. Pieter Noordzij, MD

BOSTON, MA

Objectives: To determine differences in outcomes and patient satisfaction in endoscopic versus open repair of Zenker's diverticulum.

Methods: Retrospective chart review of all patients at Boston Medical Center between January 1, 2000 and January 1, 2010 who underwent surgical treatment for Zenker's diverticulum. A survey was sent to these patients regarding their perceived relief of symptoms and overall satisfaction with surgery.

Results: 136 charts were initially reviewed for Zenker's diverticulum, of which 53 patients were diagnosed with Zenker's diverticulum. 22/53 (41.5%) underwent surgical repair. 7/22 (31.8%) patients who underwent surgical repair responded to our survey. 3/7 (42.9%) underwent endoscopic repair, 3/7 (42.9%) open repair, and 1/7 (14.3%) was converted to open repair. For endoscopic repair, average follow-up time was 52.7 months, time to PO intake 2.3 days, and length of admission 2.3 days. For open repair, these values were 70 months, 10.7 days, and 10 days. The most significant complications occurred with two patients who had open repair and included a post-operative hematoma with left true vocal cord immobility and intraoperative asystole. Most common responses to relative change in symptoms since undergoing surgery in both groups were 'significant improvement' or 'complete resolution.' Average score for overall satisfaction on a 10-point scale (0 not satisfied at all, 10 extremely satisfied) was 8.7 (endoscopic) and 9.75 (open).

Conclusions: While our sample size is small and statistical significance cannot be determined, our data suggest that open repair may be associated with more significant complications, longer length of hospital admission, and increased time to PO. However, overall satisfaction with long-term follow up may not significantly differ.

1-040

VOICE OUTCOMES FOLLOWING POSTERIOR CORDOTOMY IN PATIENTS WITH BILATERAL VOCAL FOLD IMMOBILITY

Laureano Giraldez, MD

Klein Adam, MD

Jennifer Gross, MD

Michael Johns, MD

ATLANTA, GA

Objectives: To assess voice outcomes in patients who underwent cordotomy for bilateral vocal fold immobility.

Study Design: Retrospective medical record review.

Methods: Patients with bilateral vocal fold immobility who underwent cordotomy between 2007 and 2012 were included. Voice related quality of life scores (VRQOL) pre and post operatively were analyzed. Perceptual voice assessment was performed using the CAPE-V instrument pre and post-operatively in a blinded fashion.

Results: 15 patients (8 men and 7 women) had complete VRQOL data sets and were included for this analysis with a mean follow up time of 3 months. On average, VRQOL scores improved after cordotomy from 47.33 to 59.33 ($p=0.16$). Only 3 of 15 patients reported decreases in VRQOL. 5 of 15 patients reported improvement in VRQOL, and the remainder varied by less than 15/100 points. All patients demonstrated worse CAPE-V global scores on perceptual evaluation.

Conclusion: Voice-related quality of life scores paradoxically improve or vary little after cordotomy for patients who have BVFI despite deterioration in perceptual voice quality. Patients may perceive an improvement in vocal effort after cordotomy because of the reduction in air hunger.

1-041

THE RISK OF VOCAL FOLD ATROPHY AFTER MULTIPLE STEROID INJECTIONS OF THE VOCAL FOLDS

Laureano Giraldez, MD

Michael Johns, MD

ATLANTA, GA

Objectives: To illustrate the risk of vocal fold atrophy in patients that receive multiple subepithelial steroid injections for vocal fold scar.

Study Design: Case series of two patients that developed vocal fold atrophy after a series of subepithelial steroid injections in the vocal folds for scar.

Methods: The medical records of two patients who underwent multiple subepithelial steroid infusions for scarring of the vocal folds were reviewed.

Results: A female aged 67 and a man aged 53, Two patients underwent a series of weekly subepithelial infusions of dexamethasone 10mg/mL . 6 injections were performed in a 67 year old woman with severe vocal fold inflammation related to CREST syndrome. 4 injections were performed in a 53 year old man with vocal fold stiffness following radiation therapy in the remote past. Both patients developed a weak and breathy voice one to two weeks after the last steroid injection was performed. On videostroboscopy, the female patient, who underwent bilateral injections ,developed bilateral vocal fold atrophy with a large midline glottal gap during phonation. The male who underwent unilateral injections developed unilateral vocal fold atrophy with new glottal insufficiency. The vocal atrophy resolved in both cases spontaneously over the following 4 months.

Conclusion: Serial subepithelial steroid infusions of the vocal folds, although safe in the majority of patients, carry the risk of causing temporary vocal fold atrophy when given at short intervals.

1-042

AIRWAY RECONSTRUCTION IN 22Q11.2 DELETION ASSOCIATED WITH POOR WOUND HEALING AND INCREASED INFECTIOUS COMPLICATIONS

Pamela Mudd, MD

Karen Zur, MD

PHILADELPHIA, PA

Peggy Kelley, MD

AURORA, CO

Purpose: This case series identifies 3 patients with 22q11.2 deletion undergoing airway reconstruction who had infectious complication at the site of repair.

Design: Three patients identified in two separate Airway Programs were recognized as having unusual infectious complications at the site of airway reconstruction. The three patients were identified as having 22q11.2 deletion syndromes. The charts of these patients were examined retrospectively for associated immunodeficiency testing and the clinical course was critically examined. A complimentary literature review on immunodeficiency and wound healing in 22q11.2 deletion is reviewed.

Summary of results: The three patients had laryngotracheal reconstruction of the subglottis with costochondral graft in addition to lysis of glottic atresia with placement of a keel. Infectious complications included abscess formation, sepsis, and extrusion of a keel. All three patients required additional procedures for these complications. All patients are decannulated and considered to have a successful airway repair. Two patients had full immunology testing available both with alterations in T cell immunity.

Conclusion: Though subglottic stenosis requiring airway reconstruction is rare in patients with 22q11.2 deletion, clinicians should be aware of the increased association of immunodeficiency in this population and should take care to observe and treat for infectious complications. Early removal of a stent and/or keel should be considered as well to reduce a foreign body reaction or infection.

1-043

DIFFUSE GLOTTIC HYPERKERATOSIS UNRESPONSIVE TO TREATMENT

Patrick Colley, MD
Michael Pitman, MD
NEW YORK, NY

Purpose: To present two cases of extremely severe laryngeal hyperkeratosis diffusely involving 360 degrees of the glottis, that did not respond to treatment or progress over five years of observation. Method: Chart review

Summary: Two patients were referred to our institution with severe leukoplakia diffusely involving both true vocal folds, the interarytenoid area and portions of the false vocal folds. Patient A had been treated by an otolaryngologist for five years and underwent six excisions revealing hyperkeratosis with occasional mild dysplasia. Patient B had been treated for suspected fungal laryngitis three times in the year prior to referral. At our institution, excision as well as a follow up biopsy 1.5 years later revealed hyperkeratosis with no evidence of fungus. The biopsy specimen had a focal area of mild dysplasia. Both patients were treated with BID proton pump inhibitors and H2 receptor antagonists as well as behavioral management. Patient A had a remote smoking history and patient B drank two alcoholic beverages per day. Neither patient's laryngeal lesions improved despite medical management and surgical excision as well as two KTP laser treatments in patient A. Over 5 years, despite the severity and diffuse nature of the hyperkeratosis, there was no progression of the disease grossly or histologically.

Conclusions: Severe diffuse glottic hyperkeratosis may have a biology different from typical leukoplakia. If so, these patients could be safely observed and avoid the morbidity of the treatment such as patient A experienced, undergoing six direct laryngoscopies with lesion excision in five years.

1-044

SINGLE STAGED IN SITU TISSUE ENGINEERING APPROACH FOR WIDELY AFFECTED TRACHEA AND RECURRENT LARYNGEAL NERVE DUE TO THYROID PAPILLARY CARCINOMA.

Masaru Yamashita, MD
Rie Kanai, MD
Shin-Ichi Kanemaru, MD
Fumiko Kuboshima, MD
Toshiki Maetani, MD
Takuya Tsuji, MD
Misaki Yamamoto, MD
OSAKA, JAPAN

Purpose of the report: Strategies for malignant tumor resection of laryngotracheal area are controversial in consideration of postoperative functional preservation. Aggressive resection often requires multiple reconstructive surgeries in general, while insufficient resection often results in local tumor recurrence. We have developed a novel regenerative technique, in situ tissue engineering, for head and neck cancer patients. We will present a case with widely invaded thyroid papillary cancer, whose trachea and recurrent laryngeal nerve were reconstructed simultaneously using this technique.

Design and Methods of study and analysis: The IRB approved this study and privacy policy was carefully considered. The patient was 78 year-old female, who was suffering from bloody sputum for three months. She was diagnosed as thyroid papillary carcinoma (T4N0M0) preoperatively; apparent tumor invasion into tracheal lumen from the right lobe thyroid cancer was noted. Subtotal thyroidectomy was performed to this patient. Two thirds of circumferential tracheal resection was made about five tracheal rings in length. Her right recurrent laryngeal nerve was also resected about 2 inches in length. Artificial trachea and artificial nerve graft were anastomosed to the surgical sites as scaffolds. No tracheostomy was performed.

Summary of Results: Tracheal mucosal lining was fine post-operatively. No recurrence was noted until postoperative 12 months. Good vocal tension was maintained in her right vocal fold although no movement was observed yet.

Conclusions: This combined in situ tissue engineering technique showed favorable results. Single staged regenerative method, which can omit multiple staged surgeries, is ideal especially for aged patients.

1-045

A NOVEL TECHNIQUE FOR THE QUANTIFICATION OF THE EX VIVO BIOMECHANICAL PROPERTIES OF THE VOCAL FOLDS

Michael Sobieraj, MD

Milan Amin, MD

Rodolfo Ancieta, DDS

Marta Baldassarri, MD

Ryan Branski, MD

Paulo Coehlo, DDS

Benjamin Paul, MD

Nick Tovar, MD

NEW YORK, NY

Purpose of Study: To determine the feasibility of nanoindentation to quantify the biomechanical properties of the vocal folds (VF) under physiologically-relevant conditions *ex vivo*.

Design and Methods of Study and Analysis: Normal rabbit larynges were harvested, embedded in PMMA, sliced at 100 μ m and polished. The midfold in the anterior dimension was identified under light microscopy and the sections were then soaked for several hours in distilled water. The midpoint between the epithelial layer and thyroarytenoid muscle was then subjected to nanoindentation using a Hysitron TI 950 nanoDMA with Triboscan software (Hysitron Inc, Minneapolis, MN) with a 100 μ m cono-spherical tip. Two points were tested in each sample. One point underwent a quasi-static ramp-hold-unramp (QS) loading pattern with a maximum load of 1000 μ N. The second point underwent a dynamic analysis frequency sweep from 10-300hz at a load of 1000 μ N with a load amplitude of 0.1 μ N.

Summary of Results: Under these conditions, consistent data was obtained in the QS state. Dynamic analysis yielded significantly more variability of data, yet the overall relationships between force and displacement as well as storage modulus and frequency were relatively consistent (plots illustrating data to be included).

Conclusions: Nanoindentation is a feasible method to quantify the biomechanical properties of the vocal fold mucosa. These measures under both QS and dynamic conditions were consistent and relatively predictable. The current study provides the proof of principle regarding this method; studies are currently underway to determine the sensitivity of this technique to quantify subtle changes to VF architecture.

1-046

MOTHERS AGAINST DECAPENTAPLEGIC HOMOLOG 3 (SMAD3) AS AN INTERESTING TARGET FOR ANTIFIBROTIC THERAPIES IN THE VOCAL FOLD.

Benjamin Paul, MD

Milan Amin, MD

Renjie Bing, MD

Ryan Branski, MD

Sonate Gandonu, MD

Benjamin Rafii, MD

NEW YORK, NY

Purpose of Study: To determine the potential for Smad3 as a target for RNA-based therapeutics as a means to treat/avoid vocal fold fibrosis. Recent data suggest that the profibrotic tissue phenotype is highly Smad3-dependent, which heterodimerizes in the cytoplasm and mediates signals from transforming growth factor (TGF)-beta

Design and Methods of Study and Analysis: Both in vivo and in vitro methods were employed to 1) quantify Smad3 gene regulation in response to injury (acute surgical injury was induced in rabbits and larynges harvested temporally out to 7 days), 2) determine the regulatory effects on Smad3 on pro-fibrotic cell activities in vitro, 3) determine the feasibility of Smad3 knockdown in vitro and the downstream effects of this altered genotype, and 4) determine the potential off-target effects of localized Smad3 knockdown in the vocal folds (siRNA for Smad3 was injected into normal rabbit vocal folds; local and distal organs were harvested).

Summary of Results: In vivo, Smad3 mRNA expression was significantly increased acutely following vocal fold injury. Localized injection of Smad3 siRNA into the normal vocal fold mucosa did not alter local or distal organ expression. In vitro, siRNA for Smad3 significantly altered collagen metabolism among other pro-fibrotic cell activities with minimal cytotoxicity.

Conclusions: The current study described a potential therapeutic target for the vocal fold fibrosis and provided the necessary foundational and proof-of-principle data regarding the utility for RNA-based therapeutics as a potential treatment modality for the vocal folds.

1-047

ENDOSCOPIC MANAGEMENT OF AIRWAY STENOSIS – A RETROSPECTIVE MULTINSTITUTIONAL REVIEW

Sunil Verma, MD

IRVINE, CA

Paul Bryson, MD

Michael Benninger, MD

Robert Lorenz, MD

CLEVELAND, OH

Andrew McWhorter, MD

BATON ROUGE, LA

Purpose: The management of airway stenosis has changed dramatically with time. Novel lasers, medications and tools for dilation have been introduced over the recent past. This study provides a contemporary analysis of management of this disease at multiple tertiary care institutions .

Methods: A retrospective chart review was performed at three tertiary care academic hospitals for five surgeons. Charts of all adult patients who underwent endoscopic management of subglottic and tracheal stenosis in the operating room during a two year period were analyzed. Demographic patient data, etiology of stenosis, operative course, post-operative management and disposition status were recorded.

Results: Sixty-one patients underwent 72 endoscopic procedures for airway stenosis. The majority of patients were women aged between 35 and 50 years old. The most common methods of airway management were jet ventilation and intubation with intermittent apnea. Two complications occurred. Two patients required definitive open airway surgery.

Conclusion: There are several methods to successfully manage subglottic/proximal stenosis endoscopically. The combination of microlaryngoscopy, laser lysis of stenosis and balloon dilation is safe with a low complication profile. Patients do well post operatively but often require multiple dilations for management. A small number of patients require open airway surgery.

1-048

ANALYSIS OF KTP LASER SETTINGS AND VOICE OUTCOMES IN THE TREATMENT OF REINKE'S EDEMA

VyVy Young, MD
Jackie Gartner-Schmidt, MD
Pavan Mallur, MD
Rajarsi Mandal, MD
Clark Rosen, MD
Giuseppe Staltari, MD
Adrienne Wong, MD
PITTSBURGH, PA

PURPOSE: The pulsed KTP laser is used for RRP but little is known regarding KTP use for Reinke's edema. The multiple delivery parameters and variable fiber-to-tissue distance creates difficulty in standardizing, critically evaluating and adopting this treatment by the novice KTP surgeon.

METHODS: A review of nine patients who underwent 10 treatments for RE was performed. Severity of RE was classified. Demographic, voice outcome, laser settings, laser energy and KTP treatment effect information (Mallur et al 2012) was tabulated. Perceptual, acoustic and aerodynamic voice analyses were performed.

RESULTS: KTP laser was used in the office(5) and OR(4). Laser settings ranged from 15-35Joules/15milliseconds/2pulses/second.

Severity of RE was a Yonegawa's type I(n=3), II(n=4), or III(n=2). Patients underwent KTP treatment effect type-1(n=5), type-2(n=3) or type-3(n=2). An average of 157 Joules was applied(median 110, range 6-640). Average exposure time was 0.369 seconds(median 0.35, range 0.1-0.9). No complications were reported and all patients reported improved voice(delta VHI-10= -8.3). No significant difference in the average delta VHI-10 for the office (-8.6) vs. the OR (-7.7) was found (p=0.41).

CONCLUSIONS: KTP laser can be safely and effectively used to improve voice in RE of various degrees of severity. There was no difference in treatment success in procedures in the office vs. the OR, suggesting that treatment of RE as an in-office procedure is safe, effective and cost-effective. This is the first study to provide detailed information on KTP laser settings, energy delivery, and treatment effect in management of RE and will assist the unfamiliar otolaryngologist in the implementation of KTP.

1-049

ARYTENOID ADDUCTION TO TREAT VOCAL FOLD PARALYSIS IN PRE-PUBESCENT CHILDREN

Melissa Statham, MD

ATLANTA, GA

Purpose of study: Standard of care for treatment of longstanding unilateral vocal fold paralysis in children remains undefined. While injection modalities can provide temporary improvement in symptoms related to glottal insufficiency, durable treatment options, such as laryngeal framework surgery, have not been widely performed in pre-pubescent children. Arytenoid adduction may provide immediate and durable improvement of symptoms in pediatric vocal fold paralysis without altering laryngeal growth and development.

Methods: A retrospective review of pre-pubescent patients with unilateral vocal fold paralysis who underwent arytenoid adduction under local anesthesia with intravenous sedation was performed. Results: A total of five patients (age 9-11) were identified. The procedure was successfully completed under local anesthesia with vocal feedback in all cases. All patients demonstrated improved glottal closure and deglutition postoperatively. Follow-up ranged from 10 to 18 months with durable improvement in vocal function, dysphagia, and pulmonary clearance. No airway complications were encountered intraoperatively or postoperatively. Technical challenges include maintaining good endoscopic endolaryngeal visualization as well as appropriate level of intravenous anesthesia to optimize real-time assessment of laryngeal function.

Conclusion: Arytenoid adduction, while technically difficult in the awake pediatric patient, is a feasible and potentially durable treatment option for pre-pubescent children with unilateral vocal fold paralysis. By performing this intervention, vertical height and tension can be restored to the immobile vocal fold without violating the growing laryngeal framework and disrupting native reinnervation.

1-050

BRONCHIAL ARTERY PSEUDOANEURYSM AS AN UNUSUAL CAUSE OF HEMOPTYSIS IN A PEDIATRIC PATIENT

Rusha Patel, MD

G. Peter Feola, MD

Jeremy Meier, MD

Derek Uchida, MD

SALT LAKE CITY, UT

Purpose: Hemoptysis in the pediatric population may be caused by foreign body aspiration, cystic fibrosis, bronchiectasis, or pulmonary infection. Bronchial artery anomaly as an etiology of hemoptysis is uncommon. We present a case of hemoptysis in a 12 year-old girl related to a bronchial artery pseudoaneurysm.

Case Report: A 12 year-old girl presented with a two-week history of daily, intermittent, moderate-volume hemoptysis. Rigid bronchoscopy revealed fresh clot occluding the bronchus intermedius. The thrombus wasn't removed due to concern regarding precipitating fresh bleeding. A CT angiogram was obtained, revealing atelectasis of the right middle and lower lobes of the lung. Several enhancing small arteries originating from the descending thoracic aorta were noted; the largest measured 2.4 mm in intraluminal diameter. A bronchial arteriogram showed a right mid-bronchial artery pseudoaneurysm. Contrast material was seen extravasating into the airway, confirming the pseudoaneurysm as the source of bleeding. The pseudoaneurysm was embolized using polyvinyl alcohol particles and Gelfoam. Repeat bronchoscopy was performed, and the thrombus in the bronchus intermedius was removed with no recurrence of bleeding. The patient was discharged in stable condition without any further episodes of hemoptysis.

Summary: Hemoptysis in the pediatric population can be caused by inflammatory, infectious, and systemic processes, or a vascular abnormality. Although rare, bronchial artery pseudoaneurysm should be included in the differential diagnosis of an otherwise healthy adolescent presenting with hemoptysis. In our patient, CT angiogram and formal arteriogram were key parts of the diagnostic work-up, with embolization of the pseudoaneurysm being curative.

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Dr. Harvey M. Tucker (1980)

Dr. Donald P. Vrabec (1978)

Dr. Louis W. Welsh (1977)

Dr. John R. Williams (1965)

Dr. Charles T. Yarrington, Jr. (1970)

