

TRANSACTIONS

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ALA Council – 2023



ALA Fellows & Post-Graduate Members – 2023





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MINUTES OF THE EXECUTIVE SESSIONS

REPORT OF THE SECRETARY

After election of the nominees, the 2023 roster reflects 119 Active members, 77 Emeriti members, 33 Corresponding members, 1 Honorary members, 11 Associate and 108 Post-Graduate members, for a total membership of 349 Fellows and members. These totals also reflect that we were notified that four members who passed away prior to this report.

Drs. Karla O'Dell, Anais Rameau, Babak Sadoughi, Mausumi Syamal, Christopher Tang, and Craig Zalvan were elected to Active Fellowship. Dr. Seung-Won Lee and Catherine Sinclair were elected to Corresponding Fellowship.

This year, the Post-Graduate membership welcomed Drs. Yassmeen Abdel-Aty, Ghiath Alnouri, Hayley Born, Karuna Dewan, Corina Din-Lovniescu, David Garber, Matthew Hoffman, Aaron Kaworek, Hannah Kavookjian, Hassan Paknezhad, Haig Panossian, Sarah Rapoport, Matthew Rohlfing, William Tierney, and Benjamin van der Woerd.

Dr. Blumin reported that the ALA's footprint will continue with its three half-day sessions on a Thursday and Saturday schedule in 2024.

Respectfully submitted,
Joel H. Blumin, MD
Secretary

REPORT OF THE TREASURER

Dr. Johns reported to the Fellowship that the Association continues to experience growth with its finances. Ms. Cunningham continues to manage our finances including dues in coordination with the Association Executive Management (AEM). All payments, including deposits into the bank accounts are forwarded to AEM.

Dr. Johns reported that the finances of the Association continues to show great improvement especially in the areas of payment of dues and the growth of the Sustainers' Fund. For collectible dues in 2022, 82.0% remitted payment with only 18% account for delinquencies. After several attempts to reach out to several active fellows and post-graduate members to

encourage them to bring their dues current, suspensions were issued to those who were three + years delinquent. Revenues from the Laryngoscope provide opportunities for future research although the major source of income is members' dues. We continue to encourage our Fellows to contribute to the Sustainers Fund. Again, this year, there will be a donors' campaign with all funds being earmarked for education and research.

The Council continues to practice good money management as we review practices that will result in reduced expenditures at meetings and operational expense.

As this will be my last year as treasurer, I have been honored to serve and will turn this magnificent role to Dr. Robert Buckmire.

Respectfully submitted
Michael M. Johns III, MD
Treasurer

REPORT OF THE EDITOR

Transactions

Dr. Karen Kost reported the 2022 Transactions have been downloaded to the website. They are also available for printing once downloaded. Under the guidance of Dr. Chhetri, the older versions of the Transactions, beginning with the 1879 volume, is being digitized and will be available on the website.

ALA Website

The traffic during the past year continues to increase dramatically. She also informed members the website maintenance is ongoing and that most of our web views were related to laryngology fellowship the curriculum patient education. Educational content and obituaries are continuously updated so everyone is encouraged to visit often the site often.

Videos created through the Laryngology Fellow Online Curriculum (LFOC) spearheaded by Brad DeSilva are now uploaded to our website.

The PGM Steering Committee continues to lead the project of adding content to the laryngology curriculum and patient education. As the PGM group increases its membership, additional mentors are needed. Please consider becoming a mentor when asked and your experience will be greatly valuable.

The Laryngoscope

The *Laryngoscope* continues to receive a high quality of publications. Currently, Drs. Ted Mau and Chhetri serve as associate editors; however, additional individuals are needed to join them due to the number of manuscripts received. Dr. Kost is encouraging those interested to contact Drs. Mau or Chhetri.

Laryngology Fellowship Match

Pertaining to the 2023 laryngology fellowship match, the match date is May 3.

Members Access

If you have not logged on to the site to create or update your profile, you are encouraged to do so. To continue to reduce expenses in printing and mailing information to our membership, we have begun to notify you via email of new content. If your email address is not accurate, you will not receive information such as the newsletter, ballots, and other notifications related to the Association's events. The 2023 Candidates' Ballot Book was available to eligible voters with an email address and mailed to those without email. To obtain a user name and temporary password, please contact our administrator, Maxine Cunningham at maxine.c@comcast.net.

Respectfully submitted,
Karen M. Kost, MD
Editor

REPORT OF THE HISTORIAN

The 2022-2023 Sustainers Fund Campaign began in November 2022 with a letter and donor card sent to all member categories as well as an email blast to those with valid email addresses. Currently, we have received \$12,000 in donations with numerous first time contributors contributions. This is \$1,000 less than the amount received in 2021.

As the Council continues to support the Sustainers' Fund, it is much easier to approach and encourage other ALA members, particularly former officers to make donations.

After the conclusion of the Spring meeting, the Council was notified of the passing of four esteemed Fellows in 2021 and 2022. Dr. James Snow was inducted as an Active Fellow in 1974 and elevated to Emeritus in 1995. He passed away May 28, 2022. Dr. Nobuhiko Isshiki

became a Corresponding Fellow in the 1950's. The Association didn't have a category for retiring Corresponding Fellows so his resignation was accepted. Dr. Isshiki passed away on August 14, 2021. Dr. Jack Gluckman was indicated into Active Fellowship in 1991 and elevated to Emeritus Fellowship 2010. He passed on September 7, 2022. Dr. Sid Khosla, proposed for Active Fellow by Drs. Paniello and Merati in 2014, appointed to serve on multiple committees. He passed away on December 13, 2022.

Please join me in a moment of silence as we honored our deceased colleagues.

As this is his last year on the Council and as the Historian, Dr. Benninger thank the Association for allowing him to be of service .

Respectfully submitted,
Michael S. Benninger, MD
Historian

RECIPIENTS OF THE DE ROALDES AWARD

1928 Chevalier L. Jackson
 1931 D. Bryson Delavan
 1934 Harris P. Mosher
 1937 Lee Wallace Dean
 1943 Ralph A. Fenton
 1949 George M. Coates
 1951 Arthur W. Proetz
 1954 Louis H. Clerf
 1959 Albert C. Furstenberg
 1960 Dean M. Lierle
 1961 Frederick T. Hill
 1966 Paul H. Holinger
 1970 Francis E. LeJeune
 1973 Lawrence R. Boies
 1976 Anderson E. Hilding
 1979 Joseph H. Ogura
 1982 John J. Conley
 1985 John A. Kirchner
 1985 Charles M. Norris
 1987 Walter P. Work
 1988 DeGraaf Woodman



1989 John F. Daly
 1990 Joseph L. Goldman
 1991 William W. Montgomery
 1992 M. Stuart Strong
 1993 Douglas P. Bryce
 1994 Paul H. Ward
 1995 Hugh F. Biller
 1996 Byron J. Bailey
 1997 George A. Sisson Sr.
 1998 Stanley M. Blaugrund
 1999 Jerome C. Goldstein
 2000 Thomas C. Calcatera

2001 Eugene N. Myers
 2002 Robin T. Cotton
 2003 Gayle E. Woodson
 2004 Robert H. Ossoff
 2006 Stanley M. Shapshay
 2007 W. Frederick McGuirt, Sr.
 2008 Robert T. Sataloff
 2009 Andrew Blitzer
 2010 Marshall Strome
 2011 Gerald Healy
 2012 Robert T. Sataloff
 2013 James L. Netterville
 2014 Marvin P. Fried
 2015 C. Gaelyn Garrett
 2016 Steven M. Zeitels
 2017 Steven Gray (Posthumously)
 2018 Michael S. Benninger
 2019 Bruce Pearson
 2020-21 Charles N. Ford
 2022 Peak Woo
 2023 Sid Khosla (Posthumously)

RECIPIENTS OF THE CASSELBERRY AWARD

1923 George Fetterolf
 and Herbert Fox
 1928 Ralph A. Fenton
 and O. Larsell
 1929 Richard A. Kern
 and Harry P. Schenck
 1929 Edward H. Campbell
 1931 Arthur W. Proetz
 1934 Anderson C. Hilding
 1936 Francis E. LeJeune
 and Joel J. Pressman
 1939 H. Marshall Taylor
 and Brien T. King
 1940 French K. Hansel

1941 Noah D. Fabricant
 1946 Paul H. Holinger
 1949 Henry B. Orton
 1962 Hans von Leden
 1966 John A. Kirchner
 and Barry D. Wyke
 1968 Joseph H. Ogura
 1985 H. Bryan Neel III
 1987 Joseph J. Fata
 1991 James L. Koufman
 1993 Frank E. Lucente
 1994 Ira Sanders
 1998 Steven M. Zeitels
 1999 Clarence T. Sasaki
 2006 Kimiori Sato

2009 Randal C. Paniello
 2010 Priya Krishna
 2017 Ted Mau, Hao-Min Pan,
 Lesley F. Childs
 2018 Seong Keun Kwon, Young
 Hwan Choi, Tae Ho Kim,
 In Gu; Kim, Jin H Lee
 2021 Mark Lee, Ted Mau,
 Lucian Sulica
 2022 Neha Reddy, Patrick
 Schlegel, Yoonjeong Lee,
 Dinesh Chhetri
 2023 Hye Rhyn Chung, Yoonjeong
 Lee, Neha Reddy, Zhaoyan
 Zhang, Dinesh Chhetri

RECIPIENTS OF THE GABRIEL F. TUCKER AWARD

1987 Seymour R. Cohen
 1988 Charles F. Ferguson
 1989 Blair Fearon
 1990 Gerald B. Healy
 1991 John A. Tucker
 1992 Bruce Benjamin
 1993 John N. G. Evans
 1994 Joyce A. Schild
 1995 Robin T. Cotton
 1996 Haskins K. Kashima
 1997 Lauren D. Holinger
 1998 Philippe Narcy

1999 Bernard R. Marsh
 2000 Trevor J. I. McGill
 2001 Donald B. Hawkins
 2002 James S. Reilly
 2003 Ellen M. Friedman
 2004 C. Martin Bailey
 2005 William P. Potsic
 2006 Amelia F. Drake
 2007 Colin Barber
 2008 Seth Pransky
 2009 William Crysedale
 2010 Charles M. Myer, III

2011 Mark Richardson
 2012 George Zalzal
 2013 Andrew Inglis
 2014 Linda Brodsky
 2015 Dana Thompson
 2016 Michael Rutter
 2017 Paolo Campisi
 2018 Noel Garabedian
 2019 Marshall Smith
 2020-21 Ellen Deutsch
 2022 Craig Derkay
 2023 J. Paul Willging

RECIPIENTS OF THE NEWCOMB AWARD

1941	Burt R. Shurly	1971	Daniel C. Baker, Jr	1998	Andrew Blitzer
1942	Francis R. Packard	1972	Alden H. Miller	1999	Hugh F. Biller
1943	George M. Coates	1973	DeGraaf Woodman	2000	Robert W. Cantrell
1944	Charles J. Imperatori	1974	John J. Conley	2001	Byron J. Bailey
1947	Harris P. Mosher	1975	Francis W. Davison	2002	Gerald B. Healy
1948	Gordon Berry	1976	Joseph L. Goldman	2003	Steven D. Gray
1949	Gordon B. New	1977	F. Johnson Putney	2004	Charles W. Cummings
1950	H. Marshall Taylor	1978	John F. Daly	2005	Roger L. Crumley
1951	John D. Kernan	1979	Charles F. Ferguson	2006	Charles N. Ford
1952	William J. McNally	1980	Charles M. Norris	2007	Robert H. Ossoff
1953	Frederick T. Hill	1981	Stanton A. Friedberg	2008	Gayle E. Woodson
1954	Henry B. Orton	1982	William M. Tribble	2009	Marvin P. Fried
1955	Thomas C. Galloway	1983	Harold G. Tabb	2010	Diane Bless
1956	Dean M. Lierle	1984	Daniel Miller	2011	Jamie A. Koufman
1957	Gordon F. Harkness	1985	M. Stuart Strong	2012	Steven M. Zeitels
1958	Albert C. Furstenberg	1986	George A. Sisson	2013	Lauren Holinger
1959	Harry P. Schenck	1987	John S. Lewis	2014	Marvin P. Fried
1960	Joel J. Pressman	1988	Douglas P. Bryce	2015	Robert T. Sataloff
1961	Chevalier L. Jackson	1989	Loring W. Pratt	2016	Nicholas Maragos
1962	Paul H. Holinger	1990	William W. Montgomery	2017	Gerald Berke
1963	Francis E. LeJeune	1991	Seymour R. Cohen	2018	Peak Woo
1964	Fred W. Dixon	1992	Paul H. Ward	2019	Robert T. Sataloff
1965	Edwin N. Broyles	1993	Eugene N. Myers	2020-21	James Netterville
1966	Lyman G. Richards	1994	Richard R. Gacek	2022	Ernest Weymuller
1967	Joseph H. Ogura	1995	Mark I. Singer	2023	Gaelyn Garrett
1968	Walter P. Work	1996	H. Bryan Neel III		
1969	John A. Kirchner	1997	Haskins K. Kashima		
1970	Louis H. Clerf				

RECIPIENTS OF THE AMERICAN LARYNGOLOGICAL ASSOCIATION AWARD

1988	Frank Netter	2001	Eugene N. Myers	2014	Robert T. Sataloff
1989	Shigeto Ikeda	2002	Catherine D. DeAngelis	2015	Robert H. Ossoff
1990	Hans Littmann	2003	William W. Montgomery	2016	Gerald Berke
1991	Arnold E. Aronson	2004	David Bradley	2017	Roger Crumley
1992	Michael Ter-Pogossian	2005	Herbert Dedo	2018	Eiji Yanagisawa
1993	C. Everett Koop	2006	Christy L. Ludlow	2019	Peak Woo
1994	John C. Polanyi	2007	John A. Kirchner	2020-21	Nobuhiko Isshiki
1995	John G. Batsakis	2008	Gerald B. Healy	2022	Edie Hapner
1996	Ingo Titze	2009	Stanley M. Shapshay	2023	Andrew Blitzer
1997	Matina Horner	2010	Clarence T. Sasaki		
1998	Paul A. Ebert	2011	Lawrence DeSanto		
1999	Bruce Benjamin	2012	Minoru Hirano		
2000	M. Stuart Strong and Geza J. Jako	2013	Harvey Tucker		

RECIPIENTS OF THE AMERICAN LARYNGOLOGICAL ASSOCIATION RESIDENT RESEARCH AWARD

1990	David C. Green	2001	Andrew Verneuil	2014	Boris Paskhover
1991	Timothy M. McCulloch	2002	Dinesh Chhetri	2015	Andrea Park
1991	Ramon M. Esclamado	2003	Andrew Karpenko	2016	Andrew M. Vahabzadeh-Hagh
1992	David H. Henick	2004	Ichiro Tateya	2017	Ian-James Malm
1993	Gregory K. Hartig	2005	Samir Khariwala	2018	Molly Naunheim
1994	Sina Nasri	2007	Idranil Debnath	2019	Justin Ross
1995	Saman Naficy	2008	Tara Shipchander	2020	Ioan A. Lina
1996	Manish K. Wani	2009	David O. Francis	2021	Melissa Zheng
1997	J. Pieter Noordzij	2010	David O. Francis	2022	Evan Compton
1998	Michael E. Jones	2011	Jeffrey Houlton	2023	Benjamin M. Laitman
1999	Alex J. Correa	2012	Lowell Gurey		
2000	James C. L. Li	2013	Yaniv Hamzany		

RECIPIENTS OF THE AMERICAN LARYNGOLOGICAL ASSOCIATION YOUNG FACULTY RESEARCH AWARD

1991	Paul W. Flint	2005	Dinesh Chhetri	2015	Nao Hiwatashi
1992	Yasuo Hisa	2006	Suzy Duflo	2016	Ryo Suzuki
1993	Jay F. Piccirillo	2007	Tack-Kyun Kwon	2017	Astha Malhotra
1994	Hans J. Welkoborsky	2008	Bernard Rousseau	2018	Catherine Sinclair
1995	Nancy M. Bauman	2009	Tsune-hisa Ohno	2019	Yue Ma
1997	Ira Sanders	2010	I-Fan Theodore Mau	2020	Yi-An Lu
1998	Kiminori Sato	2011	David Francis	2021	Yael Bensoussan
2000	Steven Bielamowicz	2012	Mika Nomoto	2022	Gary Gartling
2001	John Schweinfurth	2013	Seung Won Lee	2023	Matthew Naunheim
		2014	Jennifer Long		

THE MEMORIAL AND LARYNGOLOGICAL RESEARCH FUNDS

The Council earnestly requests that Fellows of the Association give consideration to making a special bequest to these important funds, or to becoming a Benefactor.

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Burt R. Shurly
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PRESIDENTIAL ADDRESS

Lucian Sulica, MD
New York, New York

“The Five Stages of the Laryngologist: A Non-Randomized but Pretty Blinded Retrospective Study”

Moments in a career which serve as inflection points – graduations, promotions, Trio Fellowship, Presidency of the ALA -- inevitably provoke big thoughts, the urge for a grand synthesis, some cohesive framework to chart the arc of a professional lifetime. We’ve been given some great summaries and overviews over the years. Dr. Simpson cast our predecessors and mentors as Rock Stars in Laryngology, Dr. Rosen – who I had no idea was such a huge fan of agriculture -- gave us a great talk on Silos last year.

The mother of these overviews is without doubt the riddle of the Sphinx: “What goes on four legs in the morning, two at noon, and three in the evening?” But that’s a little too grand for a professional career, too big in scope for what I’m after.

The actor Ricardo Montalban – yes, Mr. Roark from Fantasy Island, “rich Corinthian leather,” Captain Kirk’s nemesis Khan – capped a seven decade career in the movies in 2004. He may not have been a headliner or the leading man, but he had more than his measure of equanimity. He divided the actor’s career into 5 stages:

1. Who is Ricardo Montalban?
2. Get me Ricardo Montalban!
3. Get me someone like Ricardo Montalban!
4. Get me a young Ricardo Montalban!
5. Who is Ricardo Montalban?

That seems like just the thing, applicable well beyond the movie studio. The career of an academic physician clicks in to that framework very nicely.

Stage I: Who is Ricardo Montalban?



Some of you know my first intellectual love was Mesoamerican archaeology, and I spent several field seasons in the Aztec highlands of Mexico in preparation for a career in that field. It was a dream – intellectually stimulating, technically challenging, likely to yield big insights about human experience. But it was a dream. I ought to have known better. I’m an immigrant kid - My mother once told me, “You’re a smart boy. You can do anything you want in life, as long as you’re a doctor.” I found myself called to medicine by a sudden cessation in parental funding.

My preclinical years were an ordeal. I had left a world of intellectual excitement, where I was already contributing original work, for the drudgery of rote learning, with a mountain of material to master, and I could not see how I would ever return to a level where I could once again contribute insights and new ideas. A future

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New York, NY

of cookbook practice according to guidelines created by other people loomed ahead. Not much of a mission.

What changed my perspective were examples. At a time when the responsibility of being a physician was daunting, Roy Sessions, Chair of Otolaryngology at Georgetown, taught me to embrace it. Responsibility, I learned, was not a burden, but an opportunity. It was the path to being trusted by others, the greatest privilege of all. I watched him counsel patient after patient through life-altering events with sensitivity and clear-eyed insight into the person in front of him. He inspired not just me, but a whole residency corps with his example of integrity and dedication. He created an environment of tremendous professionalism and esprit de corps. He gave me my mission.

At that time, no part of training was about us. I never heard the terms “self-care” or “burnout” or any of the other buzzwords current in today’s discourse. It was about the work. There was not a lot of room or sympathy for complaint. And remember that I had colleagues – dedicated, kind, generous people, who were good surgeons and good physicians, who I loved and respected – who had serious trouble in that system. In the face of that, it’s hard to say there wasn’t room for change.

But that model of training worked for me. I never doubted that what I was doing was important. Selflessness was at the heart of it, and from that an earned respect – and self-respect. I understood what I was for. That brought – and still brings – a lot of peace to a person predisposed to existential doubt. To this day, I never question the karmic soundness of what I do every day, and for this gift, I am deeply grateful.

I am aware how dated all of that sounds. I am glad that no one is doing every other night call any more. I am aware sensibilities have changed, and we are training for a different practice landscape. But in all the talk of work-life balance I wonder if it is such a clear dichotomy. Work has given me a lot that has transformed my life. As medicine evolves, I

earnestly hope that we can continue to impart a similar sense of mission, service and pride to young otolaryngologists and resist the slide to an employee mentality. Treating clinical care as a job diminishes us. It is something much more elemental and humane.

Fellowship began as a disorienting experience. Where was the list of tasks that needed to be checked off? How was I to organize my day? What was I supposed to do with all the free time? Andy Blitzer trained with a light hand – he was a different example. But every day, I saw cases in which the larynx did things that I could not explain. He simply fed me clinical material until I started asking questions, and in this way he demonstrated to me that asking questions was a great way to spend the day, a month, a career. In fellowship training I found the intellectual frontier again, and I again felt like I stood a chance of contributing. It awakened an intellectual excitement about the larynx that still energizes me every day. Having practiced among you for 23 years, I believe we all share this in common – what an engrossing challenge!

“Mentorship” is a hot word in academia just now, as if the concept had just been invented, but there was no moment since I entered our field that I was not surrounded by mentorship, swimming in it.

I still marvel that so many people who barely knew me gave me advice, direction, opportunity, or simply encouragement. I wonder that so many were so forgiving when I was loud and certain, and of course wrong and abrasive in my certainty. I remember these people more clearly – not less – the longer I practice. I would like to mention by name Gayle Woodson, Roger Crumley, Chuck Ford, Stanley Shapshay – the last was kind in the face of a particularly egregious error on the oral boards – in a laryngology case of course. I carry their examples – and more – in my mind every day.

Stage II: Get me Ricardo Montalban!

Whatever professional success has been my portion, I owe in substantial part to making a

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routine of reviewing and examining my daily practice.

The basis of this is simply recording my work. From my first days in practice, I made it a habit to log my cases at the end of the day – not just the usual surgical log, but every patient that I saw. In the larynx, far more interesting things happen during office laryngoscopy than in the operating room. Initially that log was a crude Excel spreadsheet I filled in myself, now there's RedCap and a research coordinator. It is a time commitment that gets you home 30 minutes later every day and earns you no more money, but it allows you to interrogate your experience when a question arises. Over time it blooms into an amazing reservoir of information.

Partner to this documentation is curiosity. A PhD once asked me if I knew the difference between an MD and a PhD. When asked a question, a PhD answers "I don't know," but an MD answers "We don't know." We do a lot of hiding behind that authoritative collective "We." It not only masks ignorance, but excuses us from finding an answer.

Patients ask reasonable research questions every day. "How often do polyps come back after surgery?" "What are the chances my paralyzed vocal cord will recover by itself?" "Are the results of office laser as good as microlaryngoscopy?" There is no better source for ideas than patients. But only if we refuse to hide behind "We don't know."

Curiosity must go hand in hand with skepticism. Professional fate has placed my practice in New York City, at the spigot for phonotraumatic injury courtesy of Broadway and this loud town in general. Vocal fold hemorrhage is pretty commonplace, and nearly every patient who has one asks about the chance and risk factors for recurrence, and the consequence for their vocal abilities in the future. "We don't know." Not only didn't we know, but, if you read about vocal fold hemorrhage in our own literature, you would think that a singer's career hung in the balance every time one occurred. Yet that rang false against clinical experience. A fairly straightforward mining of the clinical database

yielded an incidence of hemorrhage among performers, an incidence of recurrence in patients who had a hemorrhage, risk factors for recurrence, and at least the beginning of an answer about long term consequences. Now, when a patient asks, reasonably enough, "What is the chance that I will hemorrhage again?" or "What is the long term risk to my voice from vocal fold hemorrhage?" we can offer data instead of "We don't know" or worse yet, some unfounded prediction of catastrophe.

As a side thought: Performers have a reputation of being needy, high-maintenance patients. I wonder how much of that is physician induced? How would a patient facing thyroidectomy react if the main take-home message were "You may lose your job and career if your vocal fold becomes paralyzed"? Who's being dramatic, the patient or us?

Hemorrhage is just one example. There remains much in our field which is dogma, a "fact" only because it has been repeated rather than demonstrated. Whenever you hear yourself answering a patient with "We don't know," find out!

Stage III: Get me someone like Ricardo Montalban!

Early on, I became aware that my company in the back rows at most conferences was remarkably consistent – the same characters, meeting after meeting. They were skeptics all, with a sense of humor finely tuned to the pretensions of the podium. For someone to present a surgical series which was impossibly large, or had a 100% success rate, or zero complications was like blood in the water for us. Better still were arguments between people about who thought of it first, and best were harangues from someone who felt their revolutionary insights had not been met with suitable deference and awe.

If you want to believe that you are the smartest person in the lecture hall, do not make friends like these. These people will puncture your pretention, call out your nonsense, feed you

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generous helpings of humble pie, and they will make you laugh about it all. Usually. They save you a lot of public embarrassment.

Such a group not only keeps your ego in check, but reminds you in concrete fashion that your colleagues are not your enemies. Your competition, maybe, but that doesn't have to be a bad thing. Your colleagues are your allies in a shared mission to move the field forward – where's the harm in racing a little? It has amazed me more than once how things that start as a lark among friends end up as substantial and even meaningful. The enemy is not among us, it is "out there" – all the factors that stand in the way of patients getting appropriate care.

The challenges you face over the course of a medical career are many but rarely unique. Others have faced them before you and after you, but your friends tend to face them all around the same time. Promotion, job change, hiring partners, training your successors, transition to retirement – there is no better mine of information, study group or support group than these people.

Sharp wits and distinguished minds are distributed liberally in this field. Get to know your them early. They have been my very good company these past 23 years.

Stage IV: Get me a young Ricardo Montalban!

It dawned in me relatively slowly that I had achieved enough experience and expertise to train someone else. For this, I am grateful once again to Andy Blitzer, who involved me as faculty in his own fellowship in 2007, for 11 years until we started our own program at the Sean Parker Institute.

Being confronted with a young, bright, ambitious pre-laryngologist has a way of bringing all of the people who are your own professional examples flooding to mind -- all of those people that have been speaking to you in your head over all these years of clinical practice. You're up now – what do you want your voice to say?

I'm happy to say that I don't bring all that to work with me every day. But training the people

who will carry on after us does move me to make the effort to live up to my examples.

Teaching that the larynx is an engrossing organ, and that it rewards close observation is easy enough because it does. One has to be a little thick to stare at the larynx for long and not get sucked in intellectually.

Similarly, little need to teach that patients tend to be interesting too, both in general and in the interaction between personalities and laryngeal complaints. Mickey Stewart is fond of saying "people are interesting," usually as a tactful way of not saying other things, but he's not wrong. We see a disproportionate amount of high-functioning, high-achieving people with high expectations of themselves and of us. Engaging with them makes for more good days than bad days.

The less obvious things to get across:

1. That it is useful to cultivate a little indifference to the opinions of others. If you find that some line of investigation is interesting, follow it, even if others don't see its potential. A little contrarianism is likelier to yield an interesting insight or innovation than following the herd.

2. That there is a difference between skepticism and cynicism. It's good to doubt, and there is a lot which is dubious. I doubt myself on a regular basis, usually after I diagnose vocal fold paresis. Skepticism usually generates thinking – the Greek root *skeptikos* means "questioning." Cynicism, though it might be good for a smart quip, is a negative swamp. There is much in medicine (and life) that can push us in that direction, but none of it comes from the thinking about the larynx and helping patients. Cynicism defeats the good idea by nipping it in the bud, and cynical expectations have a powerful way of becoming self-fulfilling.

3. That, mired in the prosaic challenges of daily practice, it takes active effort to keep your big picture in view, whatever that may be, but if you lose sight of that, it's difficult to remain motivated for everything else.

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And finally, that there is no point in simply preaching all of this. It will make no impression at all if you if you don't live it out in front of young physicians. If I've had any success in keeping faith with my ideals, I have the fellows and the residents to thank.

Stage V: Who is Ricardo Montalban?

I am offended by the angiolytic laser. For the better part of two decades, I put painstaking effort into becoming a passably good cold-knife microsurgeon of the vocal folds. Now, any reasonably coordinated individual can score some hits in the general vicinity of a vocal fold polyp and get equivalent results. I had not planned on becoming obsolete so quickly.

We cannot know which of our efforts – if any – will prove durable. The angiolytic laser may be a historical curiosity in a couple of decades. We cannot even anticipate consequences. Even if some future advance may rest in part on some idea I half-articulated or clinical observation I recorded, it will not automatically accrue to me. My trainees will

probably carry some memory of me. They may tell anecdotes about me, but there's no guarantee I'm going to like them. One day though – and inevitably – they will be a "Who?" too.

"Who is Ricardo Montalban?" is Ricardo Montalban's punchline. Profoundly humbling, but seen another way, it's also liberating. It frees us to focus on what is before us now. It even implies that "now" – before you become a "Who?" - might be the best time, the only time that matters. I'm inclined to agree with that.

We are beneficiaries of monumental examples. We have an endless field of study before us. We're free to pursue ideas which grab our intellect. We're practicing a karmically-sound profession. We have smart and entertaining colleagues at our sides, and there are bright, eager successors ready to improve on our work.

Ours are remarkable lives, by any standard, and for so many reasons. The least and maybe the most we can do is to resolve to be curious, be generous and above all be grateful.

Presidential Citations

Roy B. Sessions MD

Seabrook Island, South Carolina

This year I am honored that one of my President's Citations will be presented to an individual, Roy B. Sessions, MD, who not only served the ALA but the otolaryngology academic world and our country.

Completing his undergraduate degree at LSU in Baton Rouge and his medical degree at LSU in New Orleans, he entered the US Navy at the Oakland Naval Hospital after a one-year internship in San Francisco. He completed his military service by serving two years of active duty and four years in the Naval Reserve with the rank of Lieutenant Commander.

Dr. Sessions completed his General Surgery and Otolaryngology training at Washington University School of Medicine. Following his residency, his first academic position at the Baylor College of Medicine Department of Otolaryngology – Head and Neck Surgery where he served as Vice-Chair and Coordinator for Residency Training from 1969-'81.

In 1981, he accepted a position as Professor of Otolaryngology/Head and Neck Surgery at Cornell University School of Medicine in the Head and Neck Surgery Division of Memorial Sloan Kettering Cancer Center in NYC. Dr. Sessions was appointed Professor with Tenure and Chair of the Department of Otolaryngology/Head and Neck Surgery at Georgetown University School of Medicine, in 1988 where he remained for 10 years when he became departmental Chair of Otolaryngology/Head and Neck Surgery at Beth Israel Medical Center and Professor of Otolaryngology of Head and Neck Surgery at Albert Einstein College of Medicine. Dr. Sessions also served as Interim Director of the Beth Israel Cancer Center, and as the Co-Director of Beth Israel's Head and Neck Cancer Institute, a position that he held until his retirement in 2008.

During his almost forty-year career he was responsible for 170 scientific publications,



and 4 editions of a major textbook, *Cancer of the Head and Neck: Multidisciplinary Approach*, by Harrison, Sessions, and Hong. In 2000, the first edition of that book was awarded the Doody International Scientific Book of the Year award, having been selected from over 4,000 medical books throughout the world. A separate book, *The Cancer Experience: The Doctor, the Patient, the Journey*, was published by Roman Littlefield in April, 2012, and was widely distributed throughout the lay and medical communities.

Dr. Sessions has served on several editorial boards, including the NCI journal, PDQ. In addition to membership in our Association, Dr. Sessions maintains membership to other professional related organizations. He is highly recognized as a lecturer domestically and internationally. Although he is retired, he teaches at the Medical College of South Carolina two days per week.

I am pleased and extremely honored to present this 2023 President's Citation to my mentor and friend, Dr. Roy B. Sessions.

Presidential Citations

Michael G. Stewart, MD, MPH

New York, New York

My next honoree is a Professor and Chairman of the Department of Otolaryngology-Head & Neck Surgery at New York-Presbyterian Hospital/Weill Cornell Medical Center, and Senior Associate Dean for International Affairs and Affiliations at Weill Cornell.

Dr. Michael Stewart received a B.E. degree *summa cum laude* from Vanderbilt University, and a M.D. from Johns Hopkins University School of Medicine. He completed residency training at Baylor College of Medicine, and received his M.P.H. degree from the University of Texas School of Public Health, Houston. Dr. Stewart joined the Otolaryngology faculty at Baylor after residency training, before coming to Weill Cornell as Chair.

Dr. Stewart is the author of 2 textbooks, and more than 30 book chapters and 130 peer-reviewed publications. He has given more than 500 invited lectures nationally and internationally. He is the former Editor-in-Chief of *The Laryngoscope* journal and a past-President of the American Board of Otolaryngology – Head & Neck Surgery as



well as other national societies. Additionally, Dr. Stewart serves as a member of the ACGME Residency Review Committee for Otolaryngology from 2016 – 2022. He currently serves as Executive Vice President of the American Rhinologic Society.

Please join me in welcoming Dr. Mickey Stewart as a recipient of the ALA President's Citation

Presidential Citations

Sean Parker

Los Angeles, CA

Sean Parker is an American entrepreneur and philanthropist, most notable for co-founding the file-sharing computer service Napster at age 19, and in 2004, serving as the first president of Facebook. He also co-founded Plaxo, Causes, Airtime.com, and Brigade, an online platform for civic engagement. He serves as a board member of Spotify. In 2006, he became a managing partner of the Founders Fund until 2014 when he stepped down from his role at to focus on other projects.

In 2015, Sean announced the launching of the Parker Foundation as the founder and chairman. with the goal to focus on three areas - life sciences, global public health, and civic engagement. This foundation takes an interdisciplinary approach to large-scale challenges, combining insight, capital, science and technology, organization building, and public policy.

Recognized for providing funding for numerous research, support of cancer research, global public health and civic engagement, his philanthropy provided funding for the creation of the Sean N. Parker Center for Allergy Research at Stanford, SP Autoimmune Research Labs at UCSF, the Parker Institute for Cancer Immunotherapy and the Sean Parker Institute for the Voice at Weill Cornell Medical College – to name a few. Sean is an active supporter of groups including Code for America, Stand Up To Cancer, the Cancer Research Institute, Malaria No More, the Clinton Foundation, ONE, and the "charity: water" campaign.



He currently serves on nonprofit boards including the Obama Foundation, Global Citizen, Parker Institute for Cancer Immunotherapy, Parker Foundation, and the Museum of Contemporary Art, Los Angeles.

Due to his outstanding philanthropy, Sean was named Time's Healthcare 50 for his work in connecting cancer research, one Town and Country's Top 50 Philanthropists and was presented the Pontifical Key Philanthropy Award by Cardinal Gianfranco Ravasi at the Vatican for his cancer work in 2016.

I am elated to present this award to Sean Parker for his continuous contributions to the healthcare research and I ask you to join me in this presentation.

Presidential Citations

Masao Kume, MD

Mexico, MEXICO

Dr. Masao Kume is a graduate of the Faculty of Medicine of the National University of Mexico where he also did the postgraduate in Otolaryngology. At the end of the specialty he traveled to Japan, where he was a Fellow in Laryngeal Microsurgery with Professor Shigeji Saito in the ENT Department of the Keio University School of Medicine. On his return he worked as associate professor in the ENT Department of the General Hospital of the National Medical Center of Social Security.

Since then he began teaching Vocal Pathology and Phonosurgery both nationally and Latinamerica offering several courses. During his evolution over time he founded the Mexican Foundation of the Voice in order to continue teaching programs. He is currently the President of this organization.

In order to expand and exchange knowledge, he organized many courses including the Masters of the Phonosurgery of the Americas with the contribution of many leaders in the field of laryngology from the United States , Latin America and Europe. In 2021, he joined me in publishing a book, *Laryngeal Pathology and Phonosurgery* in Spanish. This collaboration allowed for a Spanish textbook on the subject that had never been published in Spanish and now serves to continue the expansion of the knowledge Spanish-speaking countries.



In recent years he has been founder of the Association of Laryngology and Phonosurgery and is President of the Mexican Society of Laryngology and Phonosurgery.

He currently coordinates the Department of Otorhinolaryngology at the Angeles del Pedregal Hospital, Mexico City and directs the Voice Care, Otolaryngology, Sleep Medicine and Swallowing Disorders Clinic at the same hospital where he develops a training program for residents and specialists.

Please join me in congratulating Dr. Kurme for his accomplishments in our subspecialty as I present this President's Citation to him.

Presidential Citations

LUCY BABIKIAN

New York, New York

My next awardee is recognized as the BIG SISTER at the Sean Parker Institute for the Voice. I met Lucy Babikian when Dr. Sessions assigned her to keep me out of trouble in 2000. She has been instrumental in building the laryngology practice for 23 years, including being a superb voice disagnostician for voice disorders.

Lucy has employed the Big Sister Ethic to laryngology fellows, Staff, SLPs and countless musical theater actors from dozens of Broadway productions for 15 years.

In addition to being the sister to so many at Weill-Cornell, she is the mother of two children and 3 grandchildren.

Lucy has played a significant role in our practice and I am extremely honor to present a 2023 President's Citation to her.



Presidential Citations

MAXINE CUNNINGHAM, MBA

Antioch, Tennessee

My next recipient, Maxine Cunningham, doesn't need a formal introduction as she is very much recognized by everyone who attends our meetings. She became the ALA Administrator during her tenure while working with Dr. Robert Ossoff at Vanderbilt Medical Center. She received her BA and MBA in Human Resources Management and Organizational Development from Trevecca Nazarene University. Earlier she studied Criminal Justice and Psychology at Tennessee State University.

As the ALA Administrator, she is recognized with having the steadiest of steady hands while serving not only our membership but responding to other interested parties. She often recalls conversations with Dr. Bob Sataloff who, along with Dr. Ossoff, convinced her to "lend a helping hand" that has continued for 20+ years. This is the second President's Citation Maxine has been presented with Dr. Gady Har-El doing the honors a few years ago.

Maxine is a proud mother to two children, three granddaughters, and five great-



granddaughters. Additionally, she serves as the chairperson of her family's board of directors that has more than 600 descendants in more than 29 states.

It is my distinct pleasure to present Maxine with a 2023 President's Citation as a token of our appreciation.

INTRODUCTION OF THE GUEST OF HONOR

Andrew Blitzer, MD, DDS

New York, New York

Lucian Sulica, MD

New York, New York

For this year's Guest of Honor, I have chosen an individual who is well recognized not only as a laryngologist but throughout our specialty of otolaryngology. A 1973 from Mt. Sina School of Medicine, where he also completed his residency. He completed his Doctor of Dental Medicine at the Columbia School of Dental and Oral Surgery. In 1996, Dr. Andrew Blitzer started a fellowship training program that is nationally and internationally recognized for teaching more than 37 laryngologists.

Dr. Blitzer currently is Professor Emeritus of Otolaryngology - Head & Neck, Neurology & Dentistry at New York Columbia Presbyterian University. Andy has been the recipient of numerous awards including the ALA's Newcomb and deRoaldes award, ABEA's Chevalier Jackson and two ALA Presidential Citations. In 2009 he served as the ABEA President. Andy was elected to the ALA Council in 2007 and as President in 2010. He continues his extensive service to our society, along to the ABEA, NIH, and other affiliated societies.



Considered a pioneer in Neurolaryngology, Dr. Blitzer has more than 217 peer-reviewed articles, 117 chapters and 19 books. An independent thinker, Andy is recognized as a champion of clinical integrity. I am extremely proud to introduce my 2023 Guest of Honor who is an educator and relentless advocate for his students, Dr. Andrew Blitzer.

PRESENTATION OF THE AMERICAN LARYNGOLOGICAL ASSOCIATION AWARD

Andrew Blitzer, MD, DDS

New York, New York

Tanya Meyer, MD, MS

Seattle, Washington

Thank you for this opportunity to say a few words honoring my mentor Dr. Andrew Blitzer as he receives the prestigious American Laryngological Association Award. This award is given to an individual based on outstanding achievement through their significant contributions to Laryngology.

Dr. Blitzer transformed the way that laryngologists think about laryngeal function through his pioneering collaborations with movement disorders neurologists and use of laryngeal EMG. He opened an entire field of neurolaryngology through giving the world's first botulinum toxin injections to the larynx in April 1984. His subsequent studies of the application of chemodenervation to multiple disorders of the head and neck have significantly guided clinical practice.

In addition, he has held multiple leadership positions in every academic society, and has had a prestigious laryngology fellowship training program since 1996. He has taught and but more importantly nurtured many physicians in his career. He has over 200 peer reviewed scholarly publications and multiple grant awards.

What really stands out is his strong history of mentorship. He has over 37 fellows, many in academic positions



across the United States and Internationally, practicing the skills we learned at his elbow. His mentorship was always individual – he is much more interested in determining what our goals are and helping us achieve them.

Overall Dr. Blitzer is a kind man, a skilled an empathetic surgeon, and a scientist whose thoughtful analysis of clinical conundrums have laid the foundation of his scholarly work and changed the practice of laryngology.

Dr. Blitzer, you are the consummate academic laryngologist – I can't think of someone more deserving of this honor – congratulations.

INTRODUCTION OF THE GABRIEL F. TUCKER AWARD

J. Gary Willging, MD

Cincinnati, OH

Romaine F. Johnson, MD, MPH

Dallas, TX

Ladies and gentlemen, it is my great pleasure to introduce Dr. J. Paul Willging, this year's recipient of the Gabriel F. Tucker Award, given in honor of someone who has made significant contributions to the field of pediatric otolaryngology.

Dr. Willging is a renowned expert in pediatric otolaryngology with over three decades of experience. He is particularly interested in managing feeding problems and velopharyngeal insufficiency in children. He has been at the forefront of establishing multidisciplinary care teams to ensure the best possible outcomes for his patients. He has played a vital role in establishing MultiD clinics and currently is the Medical Director for the Cincinnati Childrens' Interdisciplinary Feeding Team, Functional Endoscopic Evaluation of Swallow (FEES) Clinic, and the Velopharyngeal Insufficiency Clinic. He is also the Fellowship Director for the Cincinnati Children's Hospital Program.

Dr. Willging received his MD from the University of Cincinnati College of Medicine and completed his General Surgery and Otolaryngology residency at the University of Cincinnati Medical Center. He also completed a fellowship in Pediatric Otolaryngology at Cincinnati Children's Hospital Medical Center. He is a member of the Triological Society (serving as Program



Chair for the Sections Meetings), and a member of the ABEA, SENTAC, and ASPO.

Dr. Willging has published extensively on pediatric airway and feeding problems culminating in his magnum opus on Pediatric Dysphagia, written with Dr. Claire Miller, his long-time collaborator on pediatric feeding and FEES and a titan in her own right,

In recognition of his outstanding contributions to the field of Pediatric Laryngology and his exceptional service to the otolaryngology community, Dr. Willging is the proud recipient of the 2023 Gabriel F. Tucker Award. Please join me in congratulating our distinguished honoree tonight.

PRESENTATION OF THE JAMES NEWCOMB AWARD

G. Gaelyn Garrett, MD, MHC

Nashville, Tennessee

Lee Akst, MD
Boston, Massachusetts

During the 144th Annual Meeting of the American Laryngological Association (ALA) President's Reception, Dr. Gaelyn Garrett was presented the distinguished James E. Newcomb MD Award on May 5, 2023, in Boston, Massachusetts.

This Award was established in 1939 by a bequest from the Estate of and in Dr. Newcomb's memory. It was created to recognize a Fellow of the American Laryngological Association as a mark of esteem and appreciation for service to the Association or for outstanding contributions to the literature of laryngology with the first award given in 1941.

Currently Dr. Garrett is a Professor of Otolaryngology, the Senior Executive Medical Director of the Vanderbilt Voice Center and Guy M. Maness Chair, Laryngology and Voice. Dr. Garrett was inducted as an Active Fellow in 2002 and has served the Association on its Council as its Editor, Secretary, Vice-President-President-Elect and President as well as several committees.

Presented by Dr. Lee Akst who briefly summarized Dr. Garrett's contributions to the Association and to the literature of Laryngology that stood out in the selection process and made her extraordinarily deserving of this award. Her publication metrics can begin to tell the story of her impact on the field, including more than 150 publications over a number of topics, an H-index in the mid-30s, and greater than 3700 citations of her published works. More important, however,



has been HOW Dr. Garrett has compiled these publications and citations.

Dr. Garrett has been a mentor and role model to generations of laryngologists and trainees. She's demonstrated the value of collaborative and cooperative research and has worked with innumerable co-authors while emphasizing team building in her research and clinical efforts. Dr. Garrett has and continues to achieve these milestones while serving as a leader in many national Otolaryngology associations – including her term as President of the ALA in 2013. All of this makes her wonderfully deserving of this year's Newcomb Award.

As Dr. Akst's concluded the presentation of the Newcomb Award Plaque, he stated it was his pleasure to present Dr. Garrett with this outstanding award.

PRESENTATION OF THE DEROALDES AWARD

SID KHOSLA, MD

(Posthousmouly)

Accepted by Brother, Ashok Khosla

*Jennifer Long, MD, PhD
Los Angeles, California*

Each year the deRoaldes Award is bestowed upon an individual who has made significant contributions to the field of laryngology. This year's committee selected Dr. Sid Khosla. We were deeply saddened by Dr. Khosla's untimely death this year. Dr. Khosla was a deep thinker who challenged us to question the dogma in laryngeal physiology. He proved his theories by doing very difficult experiments with great rigor.

He was also a kind and steadfast supporter of the laryngology research community.

On behalf of the deRoaldes Award committee, I am honored to present this award posthumously to Sid's brother, Ashok Khosla, who joins us today. We hope that



this award will further cement Dr. Khosla's legacy.

INTRODUCTION OF THE FORTY-SIXTH DANIEL C. BAKER, JR. MD, MEMORIAL LECTURER

Kristina Simonyan, MD, PhD, DrMed

Boston, Massachusetts

Lucian Sulica, MD

New York, New York

I am pleased to introduce today the forty-sixth Daniel C. Baker Jr. MD Memorial Lecturer, Dr. Kristina Simonyan. Dr. Simonyan is an ALA Associate Fellow and currently serves as the Director of Laryngology Research at Massachusetts Eye and Ear.

She received her medical degree from Yerevan State Medical University in Armenia. She then did a residency in Otolaryngology, at the Georg-August University in Göttingen, Germany followed by a PhD degree in Neurophysiology from the University of Hannover, Germany as well as a second Doctor of Medicine degree from Univ of Göttingen. She then became a visiting fellow at several universities including Neuroimaging at the Massachusetts General Hospital and at the University of Pittsburgh. Kristina spent five years in the Laryngeal and Speech section at the National Institute of Health.

Dr. Simonyan's clinical research program, in the Dystonia and Speech Motor Control Laboratory, focuses on focal dystonias, with a special emphasis on spasmodic dysphonia

including the use of multimodal brain imaging, neuropathological evaluations, genetic analysis, and clinical trials for identification of the causative pathophysiology of this disorder and novel opportunities for its objective diagnosis, prediction of risk, and treatment. Kristina studies the neural mechanisms of normal and diseased speech motor control and other complex voluntary motor behaviors.

Her recent studies have mapped the large-scale neural architecture underlying speech production and its impairments in focal dystonia. This work has led to identification of potential neural markers of dystonia as well as the assessment of new therapeutic options for the treatment of this disorder.

She has won numerous awards for her work. She is uniquely trained and is a world expert in neuroimaging and neural control of the larynx. I am sure her presentation will provide helpful insight and lead to positive discussion.

Please join me in welcoming Dr. Simonyan as the 2023 Baker Lecturer.

FORTY-SIXTH DANIEL C. BAKER, JR, MD

MEMORIAL LECTURE

Laryngeal Dystonia: What Lies Ahead

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Thank you, Dr. Sulica, for your kind introduction. I am very pleased to present the Daniel C Baker Jr lecture on *Laryngeal Dystonia: What Lies Ahead*.

Dystonia is a movement disorder characterized by sustained or intermittent muscle contractions causing abnormal often repetitive movements, postures, or both. It is a rare disorder with up to 35 per 100,000 in the general population. The typical onset of the disorder is in adulthood, peaking at 30 to 50 years of age. There are cases of early onset with the symptoms starting in childhood or adulthood. Based on the symptom distribution, there are several forms of dystonia. Focal dystonia is most frequent and affects a single body segment, such as laryngeal dystonia, focal hand dystonia, musician's dystonia, etc. Segmental dystonia affects adjacent body segments, while generalized dystonia affects more than two body segments, usually spreading from the legs to the trunk. In addition, there are non-task-specific forms of dystonia that affect non-volitional behaviors, such as neck positioning, and eye blinking. On contrary, there are task-specific forms that affect highly learned behaviors, such as speaking, writing, and playing a musical instrument.

Laryngeal dystonia (LD) is characterized by involuntary spasms in laryngeal muscles. It is a task-specific disorder, affecting voice during speaking but not whispering or other emotional vocalizations. Symptom onset is usually at around 40 years of age. LD predominantly



affects white females with 4:1 female-to-male ratio. There are different clinical phenotypes of LD. The most common form is adductor laryngeal dystonia, which is caused by hyper-adduction of vocal folds leading to breaks in vowels and harsh voice quality. The abductor form of laryngeal dystonia is caused by slowed vocal fold closure, leading to prolonged voiceless consonants and breathy voice. Much rarer forms of laryngeal dystonia include singer's laryngeal dystonia, which is a subtype of both LD and musician's dystonia, with symptom characteristics of either adductor or abductor laryngeal dystonia. Finally, adductor respiratory laryngeal dystonia is characterized by laryngeal spasms occurring during inspiration

causing stridor, dyspnea, and obstruction. There are possibly different genotypes of disorder as about 25% of patients report a family history of dystonia.

The nomenclature of the disorder has undergone many iterations over time. Trauber has first described a patient with “spastic dysphonia” in 1871, followed by Schnitzler in 1895 who used the term “phonic laryngeal spasms” and “spastic aphonia.” And in 1887, Fraenkel used the term “mogiphonia” for slowly developing voice symptoms as an indication of the first comparison with focal hand dystonia. In 1899, Gowers described functional laryngeal spasms while speaking, hinting at the task specificity of dystonia. Finally, in 1968, Aronson coined the term “spasmodic dysphonia,” formally characterizing adductor and abductor types of disorder. He also helped establish that laryngeal dystonia is not a psychiatric disorder. In the 1980s, Blitzer, Jacome, Yanez, Marsden and others categorized this disorder as focal dystonia, and in 1985 Blitzer first used the term “laryngeal dystonia”. In 1987, Chauffeur and others used the EMG evidence to show that laryngeal dystonia is a motor control disorder. Later on in 1991, Blitzer and Bring first described adductor laryngeal breathing dystonia, and in 2006 Chikara and others first described singer’s dystonia. In 2021, an expert panel led by Simonyan adopted and recommended the term “laryngeal dystonia” to be used instead of spasmodic dysphonia to accurately reflect the current movement disorder, nomenclature, and progress in characterization of this disorder.

The pathophysiology of laryngeal dystonia is multifactorial. In my talk, I will overview the current understanding of disease pathophysiology and what lies ahead in terms of developing novel diagnostics and therapies. Brain imaging studies have successfully described several structural and functional alterations in patients with laryngeal dystonia over the years. These studies revealed abnormal (mostly increased) gray matter organization, abnormal (mostly decreased) white matter integrity, and abnormal structural connectivity in patients with laryngeal dystonia. Other studies examining functional brain alterations have reported abnormal (mostly increased) brain

activity characterized by altered function of the sensorimotor cortex, basal ganglia, thalamus, and cerebellum during both symptomatic and asymptomatic behaviors. They have also described abnormal activity during asymptomatic tasks as an endophenotype trait of the disorder. In addition, abnormal, mostly decreased regional connectivity and altered whole-brain functional connectivity have been reported. Specifically, the disorganization of neural communities, predominantly affecting sensory, motor, and frontal-parietal networks has been identified, which has been suggested to impact the basal ganglia, thalamus, and cerebellar neural communities and lead to the abnormal loss or gain of brain hubs, pivotal regions of information transfer within the neural network.

In addition to structural and functional alterations, a few studies have determined neuronal neurotransmitter changes, including an abnormal dopaminergic function characterized by reduced availability of striatal dopamine D2/D3 receptors, increased availability of striatal dopamine D1 receptors, and decreased dopamine release during speech production. Others have shown abnormal GABAergic function as reduced GABAergic inhibition within the cortical basal ganglia circuitry. Another factor in LD pathophysiology is its genetic underpinnings. However, as mentioned above, most LD cases are sporadic, familial dystonia has markedly reduced penetrance, and family members are closely related. While searching for the causative gene mutation of LD is an ongoing challenge, some studies examined a polygenic risk of dystonia development. Several genes associated with synapses, neuron projections, synaptic transmission, and neural development have been identified and implicated in a polygenic risk of dystonia development. These genes have also been identified to be contributing to vulnerable inferior parietal-premotor connectivity. Recently, another study has identified alterations in similar brain regions associated with the penetrance and manifestation of LD symptoms in families.

Finally, the environmental triggers have been examined for their contribution to LD pathophysiology. Several have been identified as

potential risk factors, including being a female, white and professional voice user as well as having frequent upper respiratory infections. Moreover, a link between these environmental triggers and brain changes in premotor, parietal, insular and striatal regions has been described in LD patients who were exposed to the environmental triggers prior to symptom development.

With the advancement of our knowledge of LD pathophysiology, a new viewpoint has gradually developed of this disease as a neural network disorder. This is now a widely accepted view of disorder pathophysiology instead of historically proposed pathophysiology based solely on basal ganglia dysfunction. The development of this advanced knowledge has also helped to re-think ways of diagnosing and developing new therapies for patients with LD.

Relevant to dystonia diagnosis, it has been reported that up to 50% of cases are currently misdiagnosed at the first encounter. This is due to the fact that there are no objective biomarkers for dystonia as indicators of the common pathophysiological process, and subsequently, there are no gold standard tests for diagnosis. The diagnosis is formulated purely on clinical syndrome characteristics, while the phenotypical variability of dystonia, other conditions mimicking dystonia, and the expertise and experience of the clinician add to the complexity of the final diagnosis. Such an approach is open to bias and misdiagnosis. The consensus between clinicians is hard to achieve, with the current agreement rate being at around 34%, resulting in only about 5% of patients receiving accurate diagnoses at symptom onset. Importantly, delays in diagnosis lead to deferred treatment of these patients. To overcome these diagnostic challenges, multidisciplinary team evaluations are currently recommended as the most effective and efficient ways to diagnose patients with laryngeal dystonia. The multidisciplinary team should include laryngologists, speech-language pathologists, and movement disorder neurologists. The challenge is that according to the ALA, only about 2% of otolaryngologists are specialized in laryngology; according to ASHA, less than 6% of speech-language pathologists work in a healthcare setting where LD patients are likely

to be seen, and movement disorder neurologists specialized in voice and speech disorders are estimated to be far less. While the focus should be on training highly specialized clinicians, a parallel opportunity may include using our current knowledge of disorder pathophysiology to discover a biomarker of significant diagnostic potential and the development of objective validated platforms for LD diagnosis.

A recent study reported the development of a deep learning algorithm, named DystoniaNet, to automatically identify a neural biomarker for diagnosis of dystonia. DystoniaNet uses raw structural brain MRI as input and is built on 3D convolutional neural network architecture. In this study, 392 patients with dystonia and 1770 healthy controls were used, in whom the algorithm automatically identified different brain regions comprising a neural for predicting the diagnosis of dystonia. Based on this biomarker, DystoniaNet reached 98.8% of accuracy in diagnosing LD, cervical dystonia, and blepharospasm. Compared to the current clinical diagnostic workflow, DystoniaNet is objective as it is based on dystonia pathophysiology, highly accurate, fast as the diagnostic decision is made in 0.36 seconds, and cost-effective as the diagnosis can be made during a single visit.

Relevant to the novel approaches to existing treatment, botulinum toxin is widely used as the first line of therapy in LD patients. However, there is no biomarker of injection efficacy, and the efficacy of injections is decided based purely on clinical syndrome characteristics after treatment. Typically, 3-4 injection cycles are needed to either achieve the desired benefit or establish that the injections are not relieving symptoms. Again, the phenotypical variability of dystonia and the clinician's expertise and experience contribute to the outcomes of botulinum toxin treatment. It has been reported that only 61% of patients receive injections and nearly 1/3 of patients with dystonia receive no treatment. The major problem with the current approach is mistreatment (both under- and over-treatments), which is associated with psychological and financial burdens and constantly increasing healthcare costs. A recent study has developed a new extension of DystoniaNet to automatically identify a neural

biomarker of botulinum toxin treatment outcome. The algorithm, named DystoniaBoTXNet, has been trained and tested in patients with laryngeal dystonia and other focal dystonias, such as blepharospasm, cervical dystonia, and writer's cramp. It has shown a high accuracy of 94.9% in correctly predicting the outcome of injections in LD patients and an accuracy of 97.7% in predicting the outcome of injections in patients with other focal dystonias. DystoniaBoTXNet has been validated as an objective AI platform that operates based on the dystonia pathophysiological marker, with an overall accuracy of 96.3%. It has been shown to be fast in predicting the outcome in 19.2 seconds per case and cost-effective for predicting the outcome of treatment *prior* to injections.

Relevant to the development of novel treatments, it is worth mentioning that there are currently no selectively designed or FDA-approved oral drugs for the treatment of dystonia. Some patients report anecdotal benefits from lorazepam, clonazepam, diazepam, and gabapentin. Some receive antidepressants and anti-anxiety drugs to cope with disorder-associated depression and anxiety. There is laryngeal surgery available for selected patients, which is directed to temporarily managing voice symptoms. By recent estimates, about 1/3 of patients with laryngeal dystonia do not receive any treatment.

Recent studies have focused on designing pathophysiologically defined treatments for LD. One of these studies used the phenomenon of responsiveness of dystonic symptoms to alcohol. A prior survey study has shown that over 55% of patients with laryngeal dystonia notice improvement in their voice symptoms following 1-3 alcoholic drinks. The potential therapeutic effects of alcohol are based on its effects of GABAergic neurotransmission, which is deficient in patients with LD, contributing to the loss of inhibition and, subsequently, to abnormally increased brain activity. Based on this pathophysiological feature, the oral drug, sodium oxybate, has been repurposed in an open-label clinical trial in patients with laryngeal dystonia. Sodium oxybate is gamma-hydroxybutyric acid, which mimics the effects of alcohol. When ingested orally, sodium oxybate is absorbed quickly, crosses the blood-

brain barrier, and converts into GABA within the brain. Sodium oxybate is FDA-approved for cataplexy, excessive daytime sleepiness in narcolepsy, and idiopathic hypersomnia. In patients with self-reported alcohol-responsive LD, 1.0-1.5 g of oral sodium oxybate showed improved voice symptoms in 73.9% of patients about 40 minutes after intake, with the effects lasting approximately 3.5-4 hours. The central effects of sodium oxybate in drug responders have been further associated with decreased abnormal activity within the speech neural network. It has been thus suggested that sodium oxybate shows promising benefits in improving the symptoms of alcohol-responsive laryngeal dystonia based on direct neuromodulation of disorder pathophysiology. Sodium oxybate may be established as the first oral drug specifically designed for the treatment of alcohol-responsive dystonia. When transitioned into clinical practice, the therapeutic efficacy of sodium oxybate will likely depend on a careful, objective selection of LD patients based on alcohol responsiveness of their symptoms. Another recent development of novel treatments for laryngeal dystonia has been proposed based on task specificity of voice symptoms. Prior studies have shown that there are significant changes in brain activity during symptomatic speaking, but close-to-normal brain activity during asymptomatic whispering and other laryngeal behaviors. It has been proposed that patients could learn to change their abnormal pattern of brain activity during speaking by using their close-to-normal pattern of brain activity during asymptomatic whisper. In such a way, a close-loop neurofeedback brain-computer interface (BCI) has been developed and is currently being tested in a clinical trial. The preliminary data from this trial show that the closed-loop BCI may directly affect the disease pathophysiology, acting upon abnormal neural activity. It shows promising potential in improving the symptoms of laryngeal dystonia based on neuromodulation of task-specific pathophysiology of the disorder, offering novel opportunities for home-based rehabilitation of these patients.

In summary, we have come a long way in understanding the pathophysiology of laryngeal dystonia, which allowed us to leverage this

knowledge for developing novel diagnostic tools and therapeutic approaches for advanced clinical management of this disorder.

Thank you for your attention.

SCIENTIFIC SESSIONS

Do You Like Your Voice? A Population-Based Survey of Voice Satisfaction and Cosmetic Voice Enhancement

Matthew Naunheim, MD, MBA; Molly Huston, MD

Objectives: Voice enhancement for patients without obvious vocal pathology or loss of function is rarely discussed clinically or in academic research. Our objectives were to: (1) determine voice satisfaction on a population level, and (2) assess willingness to consider interventions to change one's voice.

Methods: A standardized questionnaire was created based on previous representative surveys on dysphonia. Questions assessed demographics, health status, prevalence of voice disorders, and questions regarding satisfaction with voice. Iterative survey testing and piloting were performed. A nationally representative cohort of the general adult population (ages 18-89) was then queried in an online survey. Qualitative analysis and both descriptive and multivariate statistics were performed.

Results: A total of 1522 respondents were included, with an age, gender, and regional distribution reflective of the US population. A minority (38.8%) of respondents reported that they did not like the sound of their own voice in normal conversation; when asked about listening to a recording of their own voice, a majority (57.5%) reported dissatisfaction with voice. Discontent with one's voice was associated with younger age ($p=0.01$), female gender ($p<0.0001$), and white race ($p<0.0001$). Approximately 50.6% of respondents without a history of dysphonia would consider interventions to change their voice. Of those who indicated they may elect to change their voice, qualities regarding clarity and pitch were paramount.

Conclusion: Dissatisfaction with one's speaking voice is common. A high percentage of the general population without a voice disorder would consider interventions to change their voice.

Validation of a 3D-Printed Percutaneous Injection Laryngoplasty Simulator: A Randomized Controlled Trial

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Andrew Sango Lee, BS; Mark Lee, MD

Background/Objective: Simulation is a valuable tool in laryngology, especially in training for procedures on awake patients. However, no studies have examined whether existing percutaneous injection laryngoplasty (PIL) simulators improve user proficiency. Our objective is to evaluate whether a previously published 3D-printed laryngeal simulator improves PIL competency compared to conventional educational materials.

Study Design: Single-blinded randomized controlled trial

Methods: Otolaryngology residents with fewer than 10 PIL procedures in their case logs were recruited across multiple institutions. Participants underwent block randomization by postgraduate year to receive conventional educational materials (written and video resources) either with or without additional training with a 3D-printed laryngeal simulator. Participants performed PIL on an anatomically distinct laryngeal model via both trans-thyrohyoid and trans-cricothyroid approaches. Endoscopic and external recordings of these performances were deidentified and evaluated by two blinded laryngologists using an OSATS scale and PIL-specific checklist. Additionally, pre- and post-training surveys were administered to participants to evaluate procedure-specific knowledge and confidence.

Results: Twenty residents completed testing. Baseline participant characteristics demonstrate no significant differences in confidence level or PIL experience between groups. Senior residents receiving simulator training had significantly better respect for tissue while performing the trans-thyrohyoid approach compared to control ($p < 0.0005$). There are no significant differences in performance for junior residents.

Conclusions: A 3D-printed laryngeal simulator demonstrated value in improving performance of PIL amongst senior otolaryngology residents. This model may be a valuable and accessible educational adjunct for trainees to practice PIL.

Gender-Diverse Patients' Awareness and Utilization of Gender-Affirming Laryngological Services

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Sarah R. Pickle, MD; Victoria S. McKenna, PhD, CCC-SLP

Background: Despite gender-affirming laryngological services (GALS; e.g. surgery, voice therapy) being available nationwide, there is a discrepancy between the number of transgender and gender diverse (TGD) people with vocal incongruence and those who pursue services. Primary care (PC) is an important setting for learning about, and referrals to, GALS. The purpose of this study was to understand the relationship between access to PC and TGD individuals' familiarity with and utilization of GALS.

Methods: An anonymous cross-sectional online survey was developed in REDCap. Survey participants were recruited online and through community events, professional listservs, and medical offices. Between June-November 2022, 175 TGD respondents answered all questions related to this analysis.

Results: Respondents' mean age was 31.8 (range 18-79 years). Respondents' gender identities were: 37% trans women, 35% trans men, and 29% non-binary, genderqueer, or another gender. Of all respondents, 89% had access to PC, and 88% reported PC awareness of their gender identity. Despite this, while 50% reported vocal incongruence, only 20% had pursued professional voice therapy and 3% pursued laryngeal surgery. Approximately 30% of respondents were "somewhat familiar" with voice-related services, but 45% reported unfamiliarity with voice options.

Conclusions: Although most respondents were linked to the medical community through a PC provider, almost half (45%) of respondents were unfamiliar with gender-affirming voice options and 75% of those with vocal incongruence had not accessed GALS. Increased communication between GALS providers and PC providers would raise awareness of available services and may strengthen the referral pipeline to increase access to vocal care.

Tracheal A-Frame Deformity and Suprastomal Collapse after Pediatric Tracheostomy

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Background/Objectives: The development of lateral tracheal stenosis characterized as an A-frame deformity is a recognized long-term tracheostomy complication. The primary objective determined the incidence of A-frame deformities after pediatric tracheostomy. Secondary objectives measured rates of suprastomal collapse, tracheal granuloma excision and reconstructive surgery.

Methods: Prospective cohort of pediatric tracheostomy patients at a tertiary children's hospital between 2015 and 2020. Operative reports identified findings of tracheal A-frame deformity, suprastomal collapse, or tracheal granuloma removal.

Results: 269 children with a median age at tracheostomy of 0.5 years (IQR: 0.3-3.3) were included. A-frame deformity developed in 10% (N=27) identified at a mean of 2.7 years (SD: 1.5) after tracheostomy. Suprastomal collapse occurred for 38% of children (N=103) identified at a mean of 1.5 years (SD: 1.2) after tracheostomy. Age at tracheostomy was no different for children developing an A-frame deformity (2.8 vs. 3.2 years, $P=.77$). However, suprastomal collapse was more common after younger age at placement (1.8 vs. 3.9 years, $P<.001$). Tracheal granuloma removal was associated with the development of tracheal stenosis (60% vs. 40%, $P=.03$). Reconstructive surgery to address airway obstruction was required for 5.6% (N=15) of children.

Conclusions: Tracheal A-frame deformities developed in 10% of children within three years after tracheostomy. Suprastomal collapse, seen in 40%, is more common when tracheostomy was placed at a younger age and with a history of tracheal granuloma removal. Surgeons caring for tracheostomy-dependent children should recognize this acquired airway obstruction and consider the role of surgical correction.

Single Cell Sequence Mapping of the Human Vocal Fold Reveals Novel Cellular Heterogeneity

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Background/Objectives: Vocal fold disease and scarring are major causes of dysphonia and airway compromise resulting in reduced quality of life. Our understanding of the nuances in vocal fold healing is limited due to a lack of knowledge of specific cell types, cell locations, and cell functions within adult vocal fold epithelium and lamina propria. To better understand the response of vocal folds to injury, it is essential to know the phenotype, abundance, and distribution of differentiated cells within specific microenvironments. We thus examined the cellular landscape of human vocal folds by utilizing single-nuclei RNA-sequencing.

Methods: Healthy vocal fold tissue was excised from five patients undergoing pitch elevation surgery. Tissue blocks harvested included epithelium, vocal ligament, and thyroarytenoid musculature. Tissue was snap frozen and subjected to nuclear extraction. Nuclei were run on the Chromium 10X platform for single nuclei RNA sequencing and data was subsequently analyzed.

Results: Sequencing revealed expected groupings of epithelial, stromal, seromucinous, muscle, endothelial, and immune cells. Novel subsets of epithelial and fibroblast cells, including an intrinsically pro-fibrotic fibroblast lineage, previously unrecognized, were identified.

Conclusion: This dataset obtained through single-cell sequencing of tissue from non-traumatized human vocal folds identified both new cell subtypes and accepted populations of vocal fold cells that are likely involved in tissue stress response and wound repair. Additional confirmation of this novel cellular map through spatial sequencing and microscopic imaging may lead to new targets for vocal fold disease.

Parenteral Use of Bevacizumab in Patients with Recurrent Respiratory Papillomatosis Long-Term Outcome of a Single Institution Cohort.

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Marin Abousaud, MD; Nicole Schmitt, MD; Yong Teng, PhD; Adam Klein, MD;
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Objective: The course of recurrent respiratory papillomatosis (RRP) varies from spontaneous remission to airway obstruction with wide variability. Standard treatment involves debulking to improve voice and/or breathing. Non-surgical therapies are emerging in hopes of non-operative disease control. This retrospective review analyzes long-term safety, efficacy, and durability of clinical control in the largest reported series of parenteral bevacizumab in adults with RRP.

Methods: Twenty-three patients with known RRP who have been receiving off-label systemic bevacizumab were included. Dosage, infusion interval, number of cycles, debulking requirements, subjective outcomes, adverse events, and reasons for treatment termination were investigated.

Results: Patients have been followed for an average of 737.86 (21-1468) days. The most common starting dosing regimen was 15 mg/kg at 3 weeks in 11 followed by 10 mg/kg at 6 weeks intervals in 6 individuals. Long-term maintenance dosage varied with the least intensive regimen being 10 mg/kg at 14 week intervals. Subjective improvement of voice and/or breathing was reported in 18/23 subjects. The median time for patients that needed a procedure after treatment was 634 days. Procedures after infusions decreased from 2.65 +/- 1.99 procedures in the year prior to 0.17 +/- 0.38 procedures 6 months after and 1.21 +/- 1.41 procedures 1 year after infusions began. Therapy termination occurred in 8 subjects where only 3 were due to adverse events.

Conclusion: Parenteral bevacizumab remains a well tolerated treatment for patients with recalcitrant RRP. There appears to be a durable reduction in the frequency of debulking surgery requirements while on a maintenance regimen.

Effects of Thyroarytenoid Vibratory Asymmetry on Voice Acoustics and Perception

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Zhaoyan Zhang, PhD; Dinesh K. Chhetri, MD

Introduction: Asymmetry of vocal fold (VF) vibration is common in patients with voice pathology and is observed in 10% of normophonic individuals. While thyroarytenoid (TA) muscle activation plays a crucial role in VF vibration, how TA neuromuscular asymmetry relates to voice acoustics and perception is unknown. The present study evaluates the relationship between TA asymmetry, acoustic measures, and perception of sound stimuli.

Methods: An in vivo canine model of phonation was used to create symmetric and increasingly asymmetric TA vibratory conditions via graded bilateral stimulation of TA muscle. Naïve listeners (n=89) rated the perceptual quality of 100 unique phonatory samples from worst to best using a visual sort-and-rate task. For each phonatory condition, cepstral peak prominence (CPP), harmonic amplitude (H1-H2), root-mean-square energy, and subglottal pressure were measured. The relationships between these metrics, vibratory asymmetry, and perceptual ratings were evaluated.

Results: Increasing levels of TA asymmetry resulted in declining listener preference. Furthermore, only severely asymmetric audio samples were perceptually distinguishable from mildly asymmetric conditions. CPP was negatively correlated with TA asymmetry: Increasingly asymmetric phonation samples were associated with lower CPP values. Listeners preferred audio samples with higher values of CPP, energy and subglottal pressure, and lower values of H1-H2 (less breathy).

Conclusion: While increasing asymmetry of vocal fold vibration via asymmetric TA activation is correlated with decreased perceptual ratings, mild asymmetries are perceptually tolerated. This study contributes to our understanding of voice production and quality by identifying perceptually salient, and therefore, clinically meaningful, asymmetry.

The Management of Refractory Chronic Cough with Bilateral Superior Laryngeal Nerve Block

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Introduction: Refractory chronic cough is defined as cough persisting beyond 8 weeks that does not respond to standard medical therapies. Developing theories of a neurogenic etiology have cultivated novel treatments, such as the superior laryngeal nerve (SLN) block. Few studies exist regarding the efficacy and recommended treatment paradigm for this therapy. This study aims to expand upon the existing literature to help guide future recommendations for this treatment option.

Methods: A retrospective chart review of 164 patients with refractory chronic cough who underwent bilateral SLN block at a single institution between November 2018 and September 2022 was performed. Demographics, comorbidities, and patient-reported outcomes including pre- and post-injection Leicester Cough Questionnaire (LCQ) scores were collected and analyzed.

Results: The cohort underwent an average of 2.97 bilateral injections (range 1-22), containing either corticosteroid and local anesthetic or corticosteroid alone. 116 of 164 of patients reported an average of 67.3% reduction in their symptoms, with the treatment effect lasting 7.60 weeks on average. The average pre- and post-injection LCQ scores were 9.70 and 13.82, respectively. A lower LCQ score represents a greater impairment of health status due to cough, and the minimum important change is 1.3 points between questionnaires. The average improvement on LCQ following bilateral SLN block was 4.11 points for this cohort.

Conclusion: The use of in-office bilateral SLN block is an effective treatment that can be used alone or in conjunction with oral medications for the treatment of refractory chronic cough.

Transcriptional Subtype of Glottic Squamous Cell Carcinoma Predictive of Worse Disease-Specific Survival

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Background/Objectives: Survival among patients with early glottic cancer is excellent when stage-appropriate therapy is rendered. However, a subset of glottic cancers demonstrates a more aggressive phenotype; molecular features predictive of this phenotype have not been properly evaluated. We aimed to determine if an explicitly computationally derived transcriptional subtype of glottic squamous cell carcinoma would predict disease-specific survival (DSS).

Methods: Multiomic and clinical data were obtained from a public repository furnishing The Cancer Genome Atlas head and neck cancer analysis. The Onco-GPS computational, cancer-classification methodology was used to decompose groups of transcriptional signatures derived from glottic cancer samples into summary components to define three functional tumor subtypes ('oncogenic states'). Single sample gene-set enrichment analysis was performed to define differential oncogenic pathway activation among samples. Cox regression analysis was performed to identify predictors of DSS.

Results: Twenty-four glottic cancer samples were included. There were no state-dependent differences in hallmark clinical characteristics at diagnosis (age, tumor grade, N-classification, T-classification, lymphovascular invasion and perineural invasion). Despite this homogeneity, membership in oncogenic state #1 [S1] (containing 5 total samples) strongly predicted inferior DSS (HR 5.29; p-value= 0.008; 95% CI 1.55-18.06). S1 was the only state wherein all tumors were resected to negative margins. Tumors in S1 demonstrated relative over-expression of genes associated with epithelial-mesenchymal transition, lymphatic metastasis, KRAS pathway activation, and TERT activation. S1 demonstrated the lowest mean tumor mutational burden (3.33; p=0.009).

Conclusion: We identify a subtype of glottic cancer demonstrating worse DSS associated with parallel, relative up-regulation of several key oncogenic pathways.

Quantification of False Vocal Fold Hyperfunction during Quiet Breathing in Muscle Tension Dysphonia

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Background/Objectives: False vocal fold (FVF) hyperfunction during phonation is thought to be a diagnostic sign of muscle tension dysphonia (MTD). However, hyperfunctional patterns with phonation have also been observed in typical speakers. This study tested the hypothesis that FVF posturing during quiet breathing, as measured by the curvature of the FVF, could differentiate patients with MTD from typical speakers.

Methods: Laryngoscopic images were collected prospectively in 28 subjects with primary MTD and 32 typical speakers. Images were acquired at the end of expiration and maximal inspiration during quiet breathing, during sustained /i/, and during loud phonation before and after a 30-minute vocal loading task. The FVF curvature (degree of concavity/convexity) was quantified using a novel curvature index (CI, >0 for hyperfunctional/convex, <0 for "relaxed"/concave) and compared between the two groups.

Results: At end-expiration, the MTD group adopted a convex FVF contour, whereas the control group adopted a concave FVF contour (CI 0.123 +/- 0.046 vs. -0.093 +/- 0.030, p < 0.0001). At maximal inspiration, the MTD group had a neutral/straight FVF contour, while the control group had a concave FVF contour (CI 0.012 +/- 0.038 vs -0.155 +/- 0.018, p < 0.0001). There were no statistically significant differences in FVF curvature between groups in either the sustained voiced or loud conditions. Vocal loading did not change any of these relationships.

Conclusions: A hyperfunctional posture of the FVFs during quiet breathing especially at end-expiration may be more indicative of a hyperfunctional voice disorder than supraglottic constriction during voicing.

Return to Vocal Performance Following Microlaryngoscopy in Singers

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Background: Orthopedic literature has established well-documented timelines for return to performance (RTP) among professional athletes following common surgical interventions. No such paradigm exists for vocal performers following microlaryngoscopy. This study describes our experience and aims to establish standardized criteria for RTP among performers.

Methods: Records for adult performers who underwent surgical management of benign phonotraumatic vocal fold (VF) lesions and had a clearly documented RTP date between 2006 and 2022 were reviewed. Patient demographics, diagnoses, interventions, and post-surgical care prior to RTP were described. The need for medical and procedural interventions for 6 months afterwards was used to determine success of RTP.

Results: 69 VP (average age: 33 years, 41 (60%) female, 41 (60%) musical theater) were operated for 141 lesions (56 (40%) pseudocysts, 25 (18%) polyps, 23 (16%) varices, 18 (26%) other: cysts, midfold fibrous masses, sulcus). 56 (81%) underwent voice therapy. The average time from surgery to RTP was 65 days (range: 15-157 days). Prior to RTP, 5 (7%) patients experienced VF edema requiring oral steroids, 2 (3%) underwent a VF steroid injection, and 3 (4%) had ecchymosis or hemorrhage necessitating extended voice rest. Within 6 months following RTP, 2 (3%) received oral steroids for VF stiffness, 1 patient experienced pseudocyst recurrence, and 1 patient required VF steroid injection.

Conclusions: Return to vocal performance following microlaryngoscopy for benign phonotraumatic lesions is overwhelmingly successful. Complications of RTP at an average of two months after surgery are rare. Careful analysis of lesions and patient factors may allow earlier RTP.

A Novel Imaging Technique to Identify Vocal Fold Scar Formation

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Background: A non-invasive test to accurately diagnose and quantify vocal fold (VF) scarring from other confounding pathologies would be advantageous. Dynamic optical contrast imaging (DOCI) technology uses tissue autofluorescence to obtain real-time information of tissue composition. In this study, we describe a novel application of DOCI to identify scar tissue formation in rabbit vocal folds.

Methods: Rabbits underwent endoscopic unilateral vocal fold cordectomy to induce scar formation. After two months, vocal folds were excised and a bench-top DOCI (Dynamic Optical Contrast Imaging, UCLA) system was employed to capture images. We then applied the DOCI system to an endoscope and performed a similar analysis in vivo in a rabbit model of unilateral VF cordectomy.

Results: The DOCI was capable of distinguishing healthy VF from scarred VF with the highest discriminating power at the 440 nm wavelength ($p < 0.05$). All DOCI images of healthy and chronically scarred VF correlated with histological assessment of the tissue sections. The endoscopic DOCI system was also able to accurately detect VF scar formation after cordectomy in vivo.

Conclusion: Our study demonstrated that DOCI technology can discriminate between normal and scarred vocal folds noninvasively and in real time with similar accuracy to that of histological analysis. This work lays the foundation for the development of a DOCI-based endoscope for the diagnosis and quantification of vocal fold scar formation as well as a tool to measure treatment response.

Quantifying Postural Fatigue during In-Office Flexible Nasolaryngoscopy

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Matthew C Mori, MD

Background/Objectives: Upwards of 74% of otolaryngologists report work-related musculoskeletal symptoms. In-office flexible nasolaryngoscopy is a common procedure that presents several ergonomic challenges given its repetitive nature, use of a monitor, and requirement for static posture. Our goal was to objectively assess postural fatigue during in-office flexible nasolaryngoscopy via quantitative measurement.

Methods: Fellowship-trained laryngologists wore five inertial measurement units on their head, chest, back, and arms while performing in-office flexible nasolaryngoscopy in their typical position. Average angles and proportion of time spent in high-risk angles were calculated for each joint. Measurements during morning versus afternoon hours were compared, and attending was added as a covariate to control for between-person postural differences.

Results: Two laryngologists were recorded over four days (18 scopes total). In all cases, the monitor was placed on the left, and the scope was held in the right hand. Laryngologists spent 58% of total scope-time in a high-risk position of any joint. Left shoulder abduction was significantly greater in the afternoon (mean 10.3deg vs 14.6deg, $p = 0.02$). Proportion of time spent in high-risk left shoulder abduction was also significantly greater in the afternoon (mean 1.9% vs 16.1%, $p = 0.05$). There were no differences in average angles or proportion of time spent in high-risk angles for the neck or back.

Conclusions: Laryngologists showed evidence of postural fatigue and increasing risk for musculoskeletal injury during repeated in-office flexible nasolaryngoscopy. Further studies are warranted to understand and facilitate optimal ergonomic positioning for common procedures and develop interventions to prevent or mitigate risk of musculoskeletal disease.

Association Between Estrogen Exposure and Idiopathic Subglottic Stenosis (ISGS)

Nainika Nanda, MD; Alexander Gelbard, MD; David O. Francis, MD, MS

Introduction: Idiopathic subglottic stenosis (iSGS) is a rare upper airway disease almost universally affecting white women. Thus, estrogen is speculated to play an important role in iSGS pathophysiology. This study aimed to evaluate relationships between estrogen exposure, disease progression, and recurrence.

Methods: This study used North American Airway Collaborative data, including adults with idiopathic subglottic obstructive airway lesions, who underwent an index procedure of endoscopic airway dilation. Estrogen exposure was defined by years from menarche to menopause. Using Kruskal-Wallis one-way analysis of variance for ordinal values and Pearson coefficient for continuous variables, we evaluated associations between estrogen exposure, disease characteristics, and time to recurrence (TTR) and interventions. Cox proportional hazards regression models compared hazard ratios by estrogen exposure. Kaplan-Meier curves were plotted for TTR based on menopausal status.

Results: In all, 603 females had complete estrogen data (33% pre-menopausal, 17% peri-menopausal, 50% post-menopausal). Median estrogen exposure was 28 years. Overall disease recurrence was not significantly correlated to estrogen exposure. Pre-menopausal patients (compared to peri-menopausal and post-menopausal, respectively) had significantly shorter time from symptom manifestation to diagnosis (1.17 vs. 1.42 vs. 2.08 years, $p < 0.001$), shorter time from diagnosis to index endoscopic airway dilation (1.90 vs. 2.50 vs. 3.76 years, $p = 0.005$), and higher number of procedures (1.73 vs. 1.20 vs. 1.08 procedures, $p < 0.001$).

Conclusion: Our findings demonstrate that pre-menopausal patients may have a more aggressive disease variant, as they present earlier, recur earlier and more frequently, and require more total interventions than their peri- and post-menopausal counterparts. However, there is no clear association.

Decellularized Cartilage for Laryngotracheal Reconstruction in a Neonatal Pig Model

Paul Gehret, BS; Alexandra Dumas, BS;
Ian Jacobs, MD; Ricardo Gottardi, PhD

Objective: Severe subglottic stenosis develops in 0.64-1.35% of the >200,000 neonatal intensive care unit infants per year (Leung et. al. 2007) and may require laryngotracheal reconstruction (LTR) where the cricoid is split and expanded with autologous cartilage. In children, a significant incidence of restenosis requiring revision surgery is tied to graft failure and tissue engineering has been proposed to develop alternative grafting options. Our objective is to utilize decellularized cartilage in a first-of-its-kind neonatal porcine LTR model.

Methods: Meniscal porcine cartilage was washed with pepsin then elastase to decellularize and create microchannels. Scaffolds were tested by compression to compare mechanical properties with native cartilage. Suturability was assessed by tensile testing of sutures to failure. The scaffolds were implanted into 4 neonatal pigs in an anterior cricoid split, and after 12-weeks, the construct phenotype, cricoid expansion, and histomorphometry were evaluated.

Results: The decellularized cartilage had similar mechanical properties to airway cartilage and resisted suture pull-through. After LTR in neonatal pigs, the decellularized cartilage was monitored via periodic endoscopy where re-epithelization, integration, and cartilage formation were observed. Post 12-weeks, the grafts were visually integrated and exhibited 4 mm of airway expansion. Additionally, micro-CT revealed larger lumen sizes compared to age matched controls with new cartilage formation inside the grafts. Finally, histology confirmed this significant neocartilage formation.

Conclusion: Our novel neonatal porcine LTR model and decellularized cartilage graft proved to expand the airway and remained viable over 3-months. This may allow for ease of graft procurement and potentially a lower revision rate.

Endoscopic Subtotal Submucosal Arytenoidectomy with Lateralization Sutures (SMALS) Covered by a Medially Based Mucosal Flap for Glottic Stenosis

Hagit Shoffel Havakuk, MD; Yaniv Hamzany, MD; Yonatan Lahav, MD;
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BACKGROUND: Glottic stenosis(GS) may result from bilateral paralysis(BVFP) or posterior glottic stenosis(PGS). Since the glottis is the principal airway sphincter, GS surgeons shift on the delicate balance between comfortable airway, aspirations, and voice. We aim to describe our surgical technique and outcome of the SMALS procedure for GS correction.

METHODS: A retrospective cohort of GS patients who underwent SMALS between 2018-2021. SMALS involves: endoscopic submucosal subtotal arytenoidectomy(preserving medial mucosal flap) and lateralization sutures. The sutures lateralize the mucosal flap to cover the arytenoidectomy bed, without lateralization of the membranous vocal fold; expending the posterior glottis, while preserving a relatively good voice and avoiding aspirations. Covering the arytenoidectomy bed with a mucosal flap enhances healing. Medical and surgical data, airway, voice and swallowing symptoms were collected. Relative glottic opening area(RGOA), and relative glottic insufficiency area(RGIA) were calculated before and post-operatively.

RESULTS: Ten patients who underwent 13 SMALS procedures were included (3 bilateral). GS etiology was PGS grade 3/4(n=4), BVFP(n=3) and combined(n=3). Two patients also had prior radiation to the larynx. All patients were tracheostomy-dependent. The mean follow-up was 22.2 months. No granulation or retracting scar was observed at follow-up. There were no major complications. Successful outcome (decannulation or permanent-capping) was achieved in 8(80%) patients. None had a persistent voice or swallowing complaints. RGOA increased in all patients(p<0.001), while RGIA remained unchanged(p=0.878).

CONCLUSIONS: SMALS is a safe and effective, novel modification of the classic arytenoidectomy, for GS correction that can be easily applied and may expand the airway without glottic insufficiency symptoms.

Implementation of Screening Tool to Trigger Tracheostomy Decannulation Evaluation by Otolaryngology

Megan Lilli, MS, CRNP, FNP-BC; Kelly Moyer, MD; Tracey Wilson, DNP

Background: Tracheostomy is a common surgical procedure increasing in prevalence, particularly amid the COVID-19 pandemic. Following clinical improvement, most patients are ultimately decannulated. At many institutions, Otolaryngology is consulted for upper airway evaluation prior to initiating capping trials designed to simulate decannulation readiness. A 22-bed adult post-acute specialty program (PASP) recognized an increase in inappropriate Otolaryngology consultations to 20%. PASP does not utilize standardized screening to evaluate tracheostomy patients appropriate for decannulation. This leads to increased health care costs, provider inefficiencies, and unnecessary patient evaluations. The purpose of this quality improvement (QI) project is to develop, implement, and evaluate the success of a tracheostomy decannulation readiness screening tool comprised of eight evidence-based clinical parameters.

Methods: PASP Pulmonology providers received training on screening tool utilization prior to implementation. Between September and December 2022, the screening tool is applied weekly by the Pulmonology team. Otolaryngology is consulted if all parameters are met. Chart audits measure screening tool utilization and appropriate consultation. Descriptive statistics are used to calculate the overall percentage of inappropriate Otolaryngology consultations.

Results: Sixty-six screening opportunities were identified in the designated time period among sixteen eligible patients, resulting in 100% compliance with weekly screening. Patients who passed screening (n=3) received an Otolaryngology consultation. Capping was recommended for 100% of patients who passed screening.

Conclusions: The screening tool accurately identifies patients appropriate for Otolaryngology consultation, as well as those not clinically ready for tracheostomy decannulation. This streamlines the multidisciplinary process, improves efficiency, and reduces untimely consultations.

Development of a Mouse Model for Short-Term Laryngeal E-Cigarette Exposure

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Joshua Martinez, MS; Joanne Soo, MD; Elizabeth Erickson-DiRenzo, PhD, CCC-SLP

Background: E-cigarettes (e-cigs) are newer and less understood inhalation agents, with increasing uptake in youths. The laryngeal health effects are largely unknown, despite these tissues being directly exposed to these challenges.

Objective: We aim to describe a mouse model of short-term laryngeal e-cig exposure and evaluate the early cellular responses to these agents in the larynx.

Methods: Mice were randomly assigned to e-cig [JUUL Mango (N=10) or JUUL Mint (N=10)] or control (N=9) groups. E-cig mice were exposed for 2 hours/day, 5 days/week using the inExpose™ inhalation system, while control mice remained in room air conditions. We examined the larynx at 1, 5 and 10 days, and report data on urinary nicotine biomarkers, body weight, vocal fold epithelial thickness and cellular proliferation, and subglottic laryngeal mucus composition.

Results: Urinary analysis showed nicotine biomarkers from the e-cig mice at all time points. Body weight was significantly lower in the JUUL Mint group compared to other groups at day 10. No difference in vocal fold epithelial thickness between the e-cig and control groups were identified; however, cellular proliferation increased in the e-cig groups in a time dependent manner. Laryngeal mucus analysis revealed increased mucus acidity of JUUL mint compared to controls or JUUL mango at day 1.

Conclusions: Our mouse model of laryngeal e-cig exposure shows successful e-cig inhalation and cellular changes, even with only short-term exposures. These findings may help to identify the location and types of cells at risk for injury and set the stage for prolonged e-cig exposures.

Vocal Folds Rejuvenation using Basic Fibroblast Growth Factor-Loaded Pyrogallol-Based Self-Crosslinking Carboxymethyl Cellulose Hydrogel in Aged Rats

Sang-Yoon Han, MD, MS; Ji-Suk Choi, PhD; Seong Keun Kwon, MD, PhD

Objectives: Sarcopenia is a common aging-related disease in which the basic fibroblast growth factor(bFGF) plays a critical role in muscle regeneration. However, because bFGF has a half-life of less than a minute, slow-releasing methods are required. When using pyrogallol-carboxymethyl cellulose(gCMC), which can be auto-gelated in the body via self-crosslinking, bFGF can be slowly delivered by a simple method. The purpose of this study was to determine the efficacy of bFGF-loaded gCMC(bFGF-gCMC) on vocal fold rejuvenation.

Methods: In this study, 22-month-old rats were used and divided into four groups (SHAM=3, commercially available carboxymethyl cellulose (CMC)=5, gCMC=6, bFGF-gCMC=6). Young rats were used for the positive control. A 20ul hydrogel injection was performed on the lateral area of vocal process. After one month, histological analysis using H&E, alcian blue, masson's trichrome, and immunofluorescence stain and functional analysis using a high-speed camera with a 40000Hz/s frame rate was carried out.

Results: The bFGF-gCMC group had the highest myofiber density($P<0.001$), followed by the gCMC, CMC, and Young groups, and the SHAM group had the lowest($P<0.001$). Interstitial fibrosis was more prevalent in the gCMC and CMC groups than in the other groups. The bFGF-gCMC group had higher alcian blue stain uptake in the lamina propria than the other groups($P<0.001$). The bFGF-gCMC group had the highest closed quotient(0.548, $P<0.001$) in the functional study, while the SHAM group had the lowest(0.298, $P<0.001$).

Conclusions: In comparison to conventional injection laryngoplasty, the bFGF-gCMC vocal fold injection improved vocal fold function and histology, and it has the potential to rejuvenate vocal folds.

Epithelial Cell Collection from the Mouse Larynx for Single-Cell RNA-Sequencing Research

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Joanne Soo, MD; Elizabeth Erickson-Direnzo, PhD, CCC-SLP

Background: The larynx is lined by specialized stratified squamous and pseudostratified columnar epithelial cell populations. We propose to use a mouse model of inhalation-induced laryngeal injury (e.g., cigarette smoke, e-cigarette vapor) to study disease development based on the transcriptional profile of individual epithelial cells. The objective of the current project was to develop a reliable method to harvest individual epithelial cells from the mouse larynx while minimizing contamination from non-laryngeal sites and non-epithelial laryngeal cells.

Methods: Mice were euthanized, and the larynx was carefully separated from non-laryngeal sites and exposed via dissection techniques. A dental brush (<1mm diameter) was inserted into the laryngeal inlet and rotated to obtain epithelial cells. Cells were then transferred from the brush to collection media, counted, and cytospin preparations prepared for immunofluorescent staining for laryngeal epithelial (i.e., pan-cytokeratin, EpCAM, NGFR, B-tubulin) and nonepithelial (i.e., vimentin, MUC5AC) cell types. Brushed laryngeal tissues were also embedded, sectioned, and stained with H&E to evaluate the locations and depth of cell collection.

Results: We collected 6000-8000 cells from a single larynx and 35000-40000 cells from combining brushings from three laryngeal tissues. H&E staining of brushed laryngeal tissues confirmed cells were collected primarily from the epithelial layer of the larynx. Immunofluorescence staining demonstrated the phenotype of individual cells was primarily epithelial.

Conclusion: We developed a reliable method of collecting epithelial cells from the mouse larynx. In future investigations, these cells will be collected following inhalation-induced laryngeal injury and analyzed for downstream cellular and molecular assays including scRNA-seq, protein analyses, and cell-culture-based experiments.

Neurophysiology of the Superior Laryngeal Nerve in an In Vivo Rat Model

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Introduction: The superior laryngeal nerve (SLN) is fundamental in laryngeal sensation, cough reflex, and pitch control. SLN injury leads to significant consequences including altered sensation, aspiration, and dysphonia. To date, in vivo measurement of the SLN remains elusive. The purpose of this study was to 1) assess the feasibility of motor and sensory evoked potentials in a rat SLN model and 2) correlate with the protective laryngeal adductor response (LAR) and nerve histology.

Methods: 20 rat hemi-laryngeal preparations (n=10) were obtained from four-month-old Sprague-Dawley rats and included in this study. Compound motor action potentials (CMAPs) and motor unit number estimation (MUNE) were calculated by stimulating the SLN at the point of medial extension near the carotid artery and by placing a recording electrode on the cricothyroid muscle. Sensory response was determined through stimulation of the SLN and laryngoscopic visualization of a LAR. SLN cross-sections were stained and axon morphometrics were quantified utilizing AxonDeepSeg software.

Results: Laryngeal evoked studies were successfully obtained in all trials. Mean CMAP amplitude and negative durations were 5.95 ± 3.25 mV and 1.56 ± 0.65 ms, respectively. The median MUNE was 2.30 (Q1=1.88; Q3=3.51; IQR=1.62). LAR was induced with a mean intensity of 0.74 ± 0.21 mV. Mean axon count, myelin thickness, and g-ratio were 407, 0.61 ± 0.28 , 0.52 ± 0.14 , respectively.

Conclusions: Laryngeal evoked data upon SLN stimulation is feasible. This neurophysiologic data can be correlated with both functional and histologic data. We anticipate that this work will provide a tractable animal model to study changes in laryngeal sensation and cricothyroid motor function with aging, chronic cough, neurodegenerative disease, aspiration, or nerve injury.

Development and Application of Automated Vocal Fold Tracking Software in a Rat Model

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Michael Pitman, MD; Yalda Moayedi, PhD

Objectives: The rat is a widely used model for studying vocal fold (VF) function after recurrent laryngeal nerve injury, but common techniques for evaluating rat VF motion remain subjective and imprecise. We developed a software package to quantify vocal fold motion and tested it on rats with iatrogenic unilateral vocal fold paralysis (VFP).

Methods: A model was developed using DeepLabCut to identify the positions of the VFs and arytenoid cartilages in transoral laryngoscope videos of the rat glottis. The model was trained to identify 16 points of interest in the glottis on >300 frames from >20 videos from both healthy Sprague Dawley rats and those with unilateral VFP. Points were used to calculate the glottic midline and VF displacement from midline. The software was applied to laryngoscope videos of adult rats before and after iatrogenic right recurrent laryngeal and superior laryngeal nerve transection (N=10, 5 male 5 female). Ratios of right to left median open-close cycle displacement range were compared before and after injury.

Results: The software accurately tracked and quantified VF displacement. Significant differences were identified between median right to left displacement range ratios prior to and following injury (pre= 1.05 ± 0.32 , post= 0.23 ± 0.09 , median \pm standard deviation; paired Wilcoxon test, $p=0.002$).

Conclusion: This approach provides fast, accurate assessment of VF motion with minimal labor and allows for quantitative comparison of lateral differences in movement. Through this novel analysis method, we can differentiate healthy movement from unilateral VFP. Further study is underway to assess the software's ability to identify more subtle VF dysfunction.

Concentration-Dependent Effects of Methylprednisolone on Human Vocal Fold Fibroblasts in Macrophage Co-Culture

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Objective. The diversity of glucocorticoid (GC) properties may underlie variability in clinical efficacy for vocal fold (VF) disease. Optimized therapeutic approaches must account for tissue complexity, and specifically, interactions between fibroblasts and inflammatory cells. We previously reported reduced GC concentrations inhibited inflammation without eliciting fibrosis in mono-cultured VF fibroblasts and macrophages suggesting a refined approach to GC concentration may improve outcomes. In the current study, we investigated concentration-dependent differential effects on fibrotic and inflammatory responses in VF fibroblasts mediated by macrophages to improve our understanding of the implications of GC concentration on clinical efficacy.

Study design. In vitro.

Methods. THP-1 monocyte-derived macrophages were stimulated with interferon- γ (IFN- γ), lipopolysaccharide (LPS), or transforming growth factor- β (TGF- β) to induce inflammatory (M(IFN/LPS)) or fibrotic (M(TGF)) phenotypes. Macrophages were then co-cultured with a human VF fibroblast cell line using a 0.22 μ m-pore transparent membrane +/-0.3-1000nM methylprednisolone. Inflammatory (CXCL10, TNF, PTGS2) and fibrotic genes (ACTA2, CCN2, COL1A1) were analyzed in fibroblasts.

Results. TNF and PTGS2 were increased by M(IFN/LPS) macrophages; this response was inhibited by methylprednisolone. ACTA2, CCN2, and COL1A1 were elevated by M(TGF) macrophages; this response was enhanced by methylprednisolone. Higher concentrations of methylprednisolone were required to upregulate ACTA2, CCN2, and COL1A1 than to downregulate TNF and PTGS2.

Conclusion. Lower concentrations of methylprednisolone inhibited macrophage-mediated inflammatory gene expression in fibroblasts. These concentration-dependent effects suggest reduced GC concentration may lower the risk of undesirable outcomes in the context of optimized efficacy.

Platelet Rich Plasma Injection in Treatment of Scar, Atrophy, Nodule and Sulcus: Short and Long Term Results

Peak Woo, MD

Objective: Platelet rich plasma (PRP) is rich in growth factors easily obtained from blood draw. Long term data after PRP injection is lacking. Since 2019, we have performed 156 laryngeal injections of PRP in 63 patients. This report is on short (<3mo.) and long term (>12 mo.) results from PRP injection.

Material and methods: 63 patients with scar (n=32), sulcus vocalis (n=19), recalcitrant nodules (n=8), atrophy (n=4) and combined (n=4) are included (median f/u = 12.3 months). Stroboscopy, voice handicap index (VHI-10), and Cepstral Spectral Index of Dysphonia (CSID) before and after treatment and at >6m after treatment were tabulated.

Results: VHI-10 changed from 20 to 14 at 3 months and from 21 to 15 at long-term, CSID scores changed from 22 to 15 short-term and 31 to 21 at long-term (p<.001 paired t-test).

Patients often reported dramatic improvements in vocal effort and easier stamina with only slight changes in VHI or CSID score. Stroboscopy in patients who reported improvement showed better closure and improved mucosal wave. Patients with severe dysphonia did less well compared to patients with mild to moderate dysphonia. Patients with acute vocal fold scar did better than long standing scar. Some patients showed short term improvements and then slow deterioration back to baseline in both VHI and CSID scores (p<.05 paired t-test).

Conclusion: There are both short and long term improvements in voice from PRP injection. Mild to moderate dysphonia patients did better. We continue to perform PRP injections in patients with vocal fold scar, sulcus and atrophy.

Impact of Rehydration Following Systemic Dehydration on Vocal Fold Gene Expression

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Background: The recommendation to rehydrate after systemic dehydration has long been a clinical mainstay. But biological evidence on the effects of rehydration, if any, are lacking.

Objective: To investigate the impact of acute systemic dehydration and rehydration on vocal fold gene expression.

Methods: Male, New Zealand white rabbits (n = 24) provided the animal model. Systemic dehydration was induced by 5 days of water restriction. Rehydration was facilitated by ad lib water for 3 days. Vocal folds were dissected. Genes for further analysis were selected based on their physiological relevance to the vocal folds and purported role in scaffolding structure, oxidative stress, hemodynamics, and extracellular matrix turnover. Relative gene expression was assessed by RT-qPCR.

Results: Systemic dehydration and rehydration were accomplished based on established biomarkers. Rehydration following systemic dehydration can modulate gene expression, with expression patterns that suggest the rehydrated state resembles the euhydrated state. Additional data analysis are ongoing.

Conclusions: This study provides molecular evidence for a transcriptional response to rehydration following acute systemic dehydration in the vocal folds. These data are the first to study gene expression following realistic dehydration and rehydration paradigms and will provide biological data to drive clinical recommendations.

Reconstruction Outcomes of Human Xenograft in Scarred Rabbit Vocal Folds

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Neha Reddy, BS; Yazeed Alhiyari, PhD; Jennifer Long, MD, PhD

Background: Cell-Based Outer Vocal fold Replacement (COVR) using human adipose-derived mesenchymal stromal cells in fibrin scaffold has been shown to regenerate the vocal fold (VF) lamina propria and epithelium when immediately implanted after mucosa excision in a rabbit model. It is not yet known if this technology is effective for the treatment of existing scars.

Objective: Compare VF reconstruction outcomes of COVR implantation after acute cordectomy versus after resection of chronic scar, and versus the control case of healing by secondary intention after cordectomy.

Methods: 18 male rabbits were randomized into three groups: Acute cordectomy with immediate COVR, endoscopic cordectomy followed by COVR 8 weeks later, endoscopic cordectomy followed by sham surgery 8 weeks later. Larynges were harvested 8 weeks following COVR or sham surgery. Outcomes included histology, human cell persistence by immunocytochemistry and Western blotting for Human Leukocyte Antigen, and excised larynx phonation.

Results: One animal in the acute COVR group died during surgery due to an obstructing tracheal hematoma. All remaining animals survived without complication to the study end date. Each animal receiving COVR had detectable human cells after 8 weeks. There was no difference among groups in the number of excised larynges that successfully phonated. The Chronic scar/COVR group produced lower fundamental frequencies than both Chronic scar/sham and Acute COVR groups.

Conclusion: COVR implant in the setting of previous VF scarring produces similar wound healing outcomes compared to acute implantation at the time of cordectomy. Further assessment of vibrational and phonatory outcomes is warranted.

Effect of Continuous Local Dexamethasone Delivery on Tissue Biomechanics in Inhalational Burn Injury in a Preclinical Model

William Detar, DO; Ronit Malka, MD; Gregory Dion, MD

Objective: Inhalational burns frequently lead to dysphonia and airway stenosis. We hypothesize local dexamethasone delivery via a novel drug-eluting electrospun polymer-mesh endotracheal tube (ETT) reduces scarring in inhalational injury.

Methods: Dexamethasone-loaded polymer mesh was electrospun onto ETTs trimmed to transglottic endolaryngeal stents and secured in 18 Yorkshire Crossbreed swine with directed 150C inhalation burns. Native trimmed ETTs were implanted in 18 additional swine with identical inhalation burns. Stents were maintained for 3 and 7 days. Vocal fold (VF) structural stiffness was measured using automated-indentation mapping and compared across groups and matched histologic assessment performed. Statistical analysis was conducted using two-way ANOVA with Tukey's post hoc test used to determine significant differences at $p < 0.05$.

Results: VF stiffness after burn decreased with longer intubation, from 19.4 (SD +/- 7.6) mN/mm at 3 days to 11.3 (SD +/- 5.2) mN/mm at 7 days ($p < .0001$). Stiffness similarly decreased with local dexamethasone delivery, from 25.9 (17.2) mN/mm at 3 days to 18.1 (13.0) mN/mm at 7 days ($p < .0001$). VF stiffness in the continuous dexamethasone delivery group was increased compared to tissues without local dexamethasone ($p = .0002$). Burned tissues treated with local dexamethasone had stiffness values similar to native VF with local dexamethasone delivery at 3 days ($p = 0.71$) but were lower at 7 days ($p < 0.0001$).

Conclusion: Local dexamethasone delivery increases VF stiffness compared to native ETTs in a laryngeal burn model, bringing tissue stiffness closer to native tissue biomechanics. These data suggest continuous local dexamethasone delivery via drug-eluting ETTs may help reduce laryngotracheal scarring with laryngotracheal burn

Long-Term Outcomes and Revision Rates in Laryngeal Reinnervation

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Breanne Schiffer, MD, MPH; Katherine Keefe, MD; Marshall E. Smith, MD

Objectives: Non-selective laryngeal reinnervation is an effective procedure to improve voice quality after unilateral vocal fold paralysis. Few studies have captured long-term outcome data, and the revision rate for this operation is currently unknown. The objective of this study is to describe long-term outcomes and revision rates of unilateral, non-selective reinnervation in pediatric and adult patients.

Methods: Patients who underwent laryngeal reinnervation from 2000-2022 with a single surgeon were identified for inclusion. Patients who underwent bilateral, super selective, and/or deinnervation and reinnervation procedures were excluded. Outcome measures included maximum phonation time (MPT), voice handicap index score (VHI), patient-reported percent normal voice, revision procedures, and complications. Data were compiled and analyzed using paired t-tests, repeated measures analysis of covariance, and binary logistic regression analysis.

Results: 180 patients underwent unilateral, non-selective ansa-recurrent laryngeal nerve (RLN) laryngeal reinnervation. Reinnervation significantly improved MPT and patient-reported percentage of normal voice and significantly decreased VHI. Thirteen patients were recommended to undergo or underwent revision surgery, corresponding to a revision rate of 7.2%. Additional procedures included medialization thyroplasty ($n = 4$), medialization thyroplasty with arytenoid adduction ($n = 4$), and injection augmentation greater than 1 year after reinnervation ($n = 5$). Factors associated with need for additional surgery included sex and time lapse from injury to reinnervation. The overall complication rate was 10%, and included minor wound infection, edema, temporary dysphagia, and hospital readmission.

Conclusion: Unilateral, non-selective laryngeal reinnervation can provide reliable improvement in vocal symptoms after recurrent laryngeal nerve injury. The revision rate after laryngeal reinnervation is favorable and comparable to framework surgery.

Ultrafast Laser Microlaryngeal Surgery for In Vivo Sub-Epithelial Void Creation in Canine Vocal Folds

Ted Mau, MD, PhD; Liam Andrus, PhD; Berk Camli, PhD; Adela Ben-Yakar, PhD

Background/Objectives: Tightly-focused ultrafast laser pulses (pulse widths 100 fs – 10 ps) provide high peak intensities to produce a spatially confined tissue ablation effect. Creation of sub-epithelial voids within scarred vocal folds via ultrafast laser ablation may help to localize injectable biomaterials to treat vocal fold (VF) scarring. Here we demonstrate the feasibility of this technique in an animal model using a custom designed endolaryngeal laser surgery probe.

Methods: Unilateral VF mucosal injuries were created in two canines. Four months later, ultrafast laser (5 ps pulses at 500 kHz) was delivered via the custom laser probe via microsuspension laryngoscopy to create sub-epithelial voids of ~3×3-mm² in both healthy and scarred VFs. PEG-rhodamine was injected into these voids. Ex vivo optical imaging and histology were used to assess void morphology and biomaterial localization.

Results: Large sub-epithelial voids in both healthy and scarred VFs were observed immediately following in vivo laser treatment. Two-photon imaging and histology confirmed ~3-mm wide sub-surface voids in healthy and scarred VFs of canine #2. Biomaterial localization within a void created in the scarred VF of canine #2 was confirmed with fluorescence imaging but was not visualized during follow-up two-photon imaging. As an alternative, the biomaterial was injected into the excised VF and could be observed to localize within the void.

Conclusions: We demonstrated sub-epithelial void formation, biomaterial injection, and biomaterial retention in a chronic VF scarring model. This pre-clinical study establishes the clinical feasibility of such an approach to treat VF scarring using injectable biomaterials

Detecting Vocal Fold Paralysis Through Machine Learning Using Explainable Machine Learning

Phillip Song, MD; Vishwanatha Rao; Daniel Low, PhD; Satrajit Ghosh, PhD

Objective: Explainable machine learning models analyze the decision-making process of complex algorithms to find the classifier's most essential characteristics. Our objective was to compare several computational models trained to detect unilateral vocal fold paralysis (UVFP) and assign importance scores to the acoustic features used in the classifications, evaluating the results to known clinical features.

Method: Case series - retrospective with a control group. Voice samples from patients with confirmed UVFP through endoscopic examination (N=77) and controls with normal voices matched for age and sex (N=77) were included. Four machine learning models were compared and SHAP was used to identify and rank the acoustic features that the models used to make decisions.

Results: The most important features were intensity, mean Mel-Frequency Cepstrum Coefficients (MFCC), mean F1 amplitude and frequency, and shimmer variability. The median bootstrapped Area Under the Receiver Operating Characteristic Curve (ROC AUC) score ranged from 0.79 to 0.87, depending on the model and task. After removing redundant features for explainability, the highest median ROC AUC score was 0.84 using only 13 features for the vowel task and 0.87 using 39 features for the reading task.

Conclusion: The machine learning models used similar categories of features related to vocal fold physiology. These features included loudness (intensity), the frequency response of the vocal tract (MFCC), perturbation analysis (shimmer), and changes in fundamental frequency. Although the models used different combinations of features, they still achieved similar effect sizes. Explainable machine learning contextualizes the accuracy relative to both model architecture and pathophysiology.

Effects of Neuromuscular Stimulation and Airflow Level on Vocal Fold Vibratory Motion

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Introduction: Analysis of medial surface dynamics of the vocal folds (VF) is critical to understanding voice production. While previous studies have mostly characterized VF vibration from a superior view, we performed 3D reconstruction of the VF medial surface vibratory motion during in vivo phonation and evaluated the essential dynamics using empirical eigenfunctions (EEF).

Methods: Graded stimulation of the recurrent and superior laryngeal nerves (RLN and SLN) was performed during phonation in an in vivo canine hemilarynx and vibration recorded using high-speed video. For each phonatory condition, three glottal cycles were 3D reconstructed from tattooed landmarks on the VF medial surface at low, medium, and high levels of airflow. Reconstructed data was de-noised using EEFs. Fundamental frequency and smoothed cepstral peak prominence (CPPS) were calculated from synchronously recorded acoustic data.

Results: The first EEFs of coronal and axial sections captured synchronal opening and closing movements of the glottis correlating with fundamental frequency. The second EEFs captured the mucosal wave moving from inferior to superior and from posterior to anterior respectively. High SLN stimulation in combination with increased flow led to a figure-eight pattern movement of the most superior landmark during oscillation. CPPS values increased with higher airflow for most stimulation conditions except for low RLN and very dominant SLN conditions.

Conclusion: We studied the intricacies of VF medial surface movement as a function of neuromuscular stimulation and degree of airflow

Electrical Stimulation of Vocal Fold Adduction Triggered by Laryngeal Electromyography using a Custom Implant

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Objective: Medialization procedures for unilateral vocal fold (VF) paralysis generally improve voice but do not fully replace dynamic VF adduction. Paralyzed VFs typically experience synkinetic reinnervation, making it feasible to elicit their movement through electrical stimulation. We tested a new laryngeal pacing implant capable of providing closed-loop (automatic) impaired-muscle stimulation in one VF triggered by electromyographic (EMG) potentials from the contralateral VF.

Methods: A custom, battery-powered, microprocessor-based stimulator was tested in eight canines with bipolar electrodes implanted within each VF, recording EMG on the left and stimulating VF adduction on the right. A cuff electrode on the left recurrent laryngeal nerve (RLN) stimulated unilateral VF adduction representing voluntary control in anesthetized animals. Closed-loop stimulation was tested during implantation (N=8) and periodically for an average of 6 months (N=5). Three animals received right RLN transection/repair with documented synkinetic reinnervation. Optimal triggering of VF stimulation from elicited EMG was achieved using independent onset and offset thresholds.

Results: In all animals, left VF activation through RLN stimulation generated a robust EMG response that rapidly triggered stimulation of contralateral thyroarytenoid and lateral cricoarytenoid muscles, causing nearly simultaneous bilateral adduction. Real-time artifact removal allowed closed-loop stimulation without entering self-perpetuating feedback despite the proximity of recording and stimulation electrodes.

Conclusion: Using a custom implant system we demonstrated the feasibility of real-time, closed-loop stimulation of one VF triggered by the activation of the contralateral VF. This approach could potentially restore dynamic glottic closure for reflexive behaviors or phonation in cases of unilateral VF paralysis with synkinetic reinnervation.

Treatment for Adductor Spasmodic Dysphonia: Botulinum Toxin Injections vs Type 2 Thyroplasty with TITANBRIDGE®

Tetsuji Sanuki, MD, PhD; Naoki Takemoto, MD, PhD

Objectives: The current gold standard of therapy for adductor spasmodic dysphonia (AdSD) is the injection of botulinum toxin type A (BTX) into intrinsic laryngeal muscles. A surgical procedure could potentially offer more stable and long-lasting voice quality. In this study, we report the long-term results of type 2 thyroplasty (TP2) with TITANBRIDGE® versus BTX injections.

Methods: 49 AdSD patients visited our hospital between August 2018 and November 2019. All patients were provided with the option of receiving BTX injections or undergoing TP 2 with TITANBRIDGE®. Patients were given the Voice Handicap Index (VHI)-10 at the same time they visited the hospital before treatments and at scheduled clinical follow-ups. For BTX injections (pre-, 2, 4, 8, 12Wks), For TP2 (pre-, 4, 12, 26, 52Wks).

Results: BTX injection was selected by 31 patients. The pre-injection VHI-10 mean score was 28. Following injections, the scores significantly improved to 18.5 ($P=0.001$) at 4 weeks, and 20.2 ($P=0.002$) at 8 weeks. There were no significant differences between the pre-injection scores, and the scores 12 weeks following the injections (21.3, $P=0.05$).

TP2 was selected by 18 patients, with all reporting relief from symptoms using the VHI-10. The mean VHI-10 score improved significantly from 27.9 to 10.3 ($P=0.003$) at 52 weeks following the surgery. There was a statistically significant difference between the two treatment groups at 12 weeks.

Conclusion: This preliminary result provides important insights into the value of Type 2 thyroplasty with TITANBRIDGE® as a potential permanent treatment for a select group of patients with AdSD

Prospective >12 Months Outcomes for Patients with Longstanding Unilateral Vocal Fold Paralysis Treated by Vocal Fold Injection Medialization with a Silk Protein Microparticle-Hyaluronic Acid Material

William Z. Gao, MD; Marcus Paoletti, BA; Yael Bensoussan, MD; Neel K. Bhatt, MD; Elizabeth Shuman, MD; Nazaneen Grant, MD; Karla O'Dell, MD; Michael M. Johns, III, MD

Background: Vocal fold injection medialization (VFIM) is widely used as an initial treatment for unilateral vocal fold paralysis (UVFP). Current practices employ materials that share the limitation of temporary clinical effect from variable resorption rates. A novel silk protein microparticle-hyaluronic acid based material (silk-HA) has demonstrated cellular infiltration and tissue deposition that may portend a durable space-occupying effect. We report on >12 months outcomes after VFIM with silk-HA.

Study Design/Methods: Prospective open-label cohort study of patients with UVFP who elected treatment with VFIM with silk-HA.

Results: 17 patients with unilateral vocal fold paralysis were treated with VFIM using silk-HA. 11/17 have >12 months follow up. 2 patients have not reached 12 months follow-up and 1 patient was lost to follow-up. 3 patients passed away or were placed in hospice for unrelated reasons. 6/11 patients demonstrated durable treatment benefit >12 months after injection with mean improvement of 20.6 ($p=0.03$) in VHI-10. VHI-10 did not change significantly between 1 month and 12 months post injection for these patients. 4 patients experienced initial benefit with later regression, and underwent thyroplasty. 2 patients exhibited severe hemilaryngeal edema within 1 week of injection consistent with idiosyncratic reaction to HA.

Conclusions: VFIM with silk-HA can offer durable improvement in voice-related outcomes for UVFP to 12 months and beyond. A subset of patients treated with silk-HA experienced early resorption around 3-4 months post injection. Clinical factors predictive of sustained treatment response to silk-HA injection remain to be elucidated.

ALA POSTERS

A Novel Approach for The Treatment of Intractable Aspiration after Supracricoid Laryngectomy

Mohammad Bilal Alsavaf, MD; Jacqueline Tardif, MA, CCC-SLP;
Eman H. Salem, MBBS; Laura Matrk, MD; Ricardo L. Carrau, MD

Background/Objectives: This manuscript aims to present a novel and successful intervention for intractable aspiration following a supracricoid laryngectomy (SCL) that could avoid the need for total laryngectomy in patients experiencing intractable aspiration after SCL.

Methods: A 67-year-old man developed severe, life-threatening pharyngeal dysphagia and laryngotracheal aspiration, rendering him dependent on a feeding tube after SCL with epiglottopexy. An incomplete posterior apposition of the laryngeal surface of the epiglottis to the arytenoids was deemed the culprit. The right and left aryepiglottic folds and the median glossoepiglottic fold were denuded using a CO2 laser. Then, an arytenoepiglottopexy was completed by placing 4-0 Vicryl between the lateral aspect of the epiglottis and arytenoids; thus, approximating these structures.

Results: Two weeks after surgery, fiberoptic endoscopic evaluation of swallowing demonstrated improved closure of the larynx upon swallowing with great upgrading in the Penetration-Aspiration scale (PAS). PAS was scored as 2, corresponding to, transient penetration for moderately thick liquids and puree solids. He also demonstrated improved secretion management and airway protection. Following a four-week course of intensive dysphagia therapy, a modified barium swallow revealed a significant improvement in airway protection, with a PAS score of 1 (no airway invasion).

Conclusions: Chronic aspiration is a life-threatening condition that can severely reduce patients' quality of life. Despite the use of current therapeutic approaches, a subset of patients will remain plagued by persistent symptoms. We introduce an innovative, simple, and quick endoscopic technique that offers benefit in controlling aspiration after SCL

A Novel Thyroarytenoid Muscle Fiber Culture

Gary Gartling, PhD; Ryosuke Nakamura, PhD; Renjie Bing, MD; Ryan C. Branski, PhD

Objectives/Hypothesis. Primary isolated muscle fiber culture is considered the most appropriate model to investigate pathological/treatment conditions in mature muscle fibers in vitro, and is well established in the hind limb. To date, thyroarytenoid (TA) fiber culture has not been described, providing opportunities to employ this method to investigate distinct TA fiber function in response to pathological/treatment conditions. This method incorporates similar biological scenarios to in vivo conditions due to satellite cell presence with increased control over extraneous variables unavoidable in vivo. The purpose of this study was to assess feasibility of a rat TA muscle fiber culture model.

Study Design. In vitro

Methods. The TA from a Sprague Dawley rat was isolated and digested in enzyme solution for 90-minutes. A smooth-tip, wide-bored pipette dissociated TA fibers from cartilage, and fibers were spread onto collagen-coated dishes and incubated at 37°C, 5% CO2 for 2-hours. The fibers were then collected and spread onto Matrigel coated dishes and incubated at 37°C, 5% CO2 for 5-days. Fiber viability was determined via intracellular esterase assay and TA muscle fiber specificity was determined via immunolabeling for Myosin Heavy Chain (MHC) and Desmin.

Results. TA muscle fibers, identified with MHC and Desmin, remained viable for 5-days, determined by fluorescent esterase reactivity within intact cell membranes.

Conclusion. Isolated TA muscle fibers were viable for up to 5-days, providing an ideal translational model to interrogate the TA response to various stimuli and pathological conditions.

A Retrospective Study to Assess the Accuracy of Frozen Sections in Laser Laryngeal Surgery

Yassmeen Abdel-Aty, MD; Christine M. Clark, MD; Hal Rives, BA; Lucian Sulica, MD

Introduction: De novo occurrence of granuloma (granulation tissue) on the membranous vocal fold is unusual and not readily explained by causative factors typical for vocal process lesions such as gastroesophageal reflux, intubation, and/or collisional trauma. We describe a series of patients with this presentation.

Methods: Cases were identified from a single academic institution over 13 years. All patients exhibited granulation tissue on pathology. Demographic details, presentation, treatment, histology, and clinical outcomes were recorded.

Results: Eight patients were identified (mean age: 74.1 ± 5.4 years, 62.5% male, 62.5% former smokers). Initial biopsy or excision revealed invasive or in-situ squamous cell carcinoma (SCC) in two patients. Persistent or recurrent granulation led to repeat biopsy or excision an average of 983.2 days later in six patients, revealing a new diagnosis of SCC in-situ in one patient. Further persistence or recurrence led to a third biopsy or excision an average of 214.7 days later in three patients, demonstrating invasive and in-situ SCC in two. Overall, invasive or in-situ SCC were diagnosed in 5 of 8 patients. An average of 2.5 biopsies were required with a mean time to diagnosis of 435 days from presentation.

Conclusions: Occurrence of granuloma on the membranous vocal fold should raise concern for malignant or premalignant disease. This concern should persist even after a negative biopsy. Because of the high risk of occult malignancy, patients should remain under surveillance over the long-term, with low threshold for repeat tissue sampling for any recurrence of granulation.

A Retrospective Study of Glottic Cyst Histopathology and Its Clinical Presentation

Nupur Kapoor Nerurkar, MS (ENT), MBBS

Objective: Histopathologically cysts may present as mucous retention (Koren type A and B) or epidermoid (Koren type C and D). The objective of this study is to understand the clinical presentation of these cysts.

Methods: Glottic cysts operated in a 1-year period were grouped into Koren A, B, C and D (KA, KB, KC, KD). The age of symptom presentation, gender, cyst location, laterality, associated lesions, profession and daily water consumption were noted retrospectively from medical records.

Results: Of a total 30 cysts, 24 (80%) were mucous retention (14 KA and 10 KB) and 6 (20%) were epidermoid (4 KC and 2 KD). Average presentation age was 45 years in KA, 52 in KB, 40 in KC and 37 in KD cysts. All epidermoid cysts (100%) were found in females unlike the male predominance (67%) in mucous cysts. All cysts, barring 2 KB, were situated at the striking zone. Average daily water consumption was 1.8 and 2 liters in mucous and epidermoid cyst patients respectively. Associated focal pit and mucosal bridge were found in 1 KC and KD patient respectively.

Conclusion: KA was the commonest cyst excised (47%) followed by KB (33%), KC (13%) and KD (7%). As 93 % of cysts were found on the striking zone, phonotrauma may be one of the possible etiologies. In this study, all epidermoid cysts were found in females, occasionally with associated lesions such as sulcus and mucosal bridge, unlike mucous retention cysts that showed a male predominance and no associated lesions.

Access Disparities In Otolaryngology

Michael Pozin, MS

This is a county-level epidemiological study to identify the travel distance to the nearest ENT for all US communities as well as the statistically significant socioeconomic differences between the hotspots and coldspots of access.

Geospatial analysis of publicly available 2015-2022 NPI records was combined with year-matched US census data to identify geospatial gaps in ENT distribution. Moran's index geospatial clustering in distance to the nearest ENT was used as the core metric for differential access determination. Mann-Whitney U test was conducted between hotspot/coldspot counties of travel distance for 60 socioeconomic and demographic variables.

Nationally, the average person was 22.34 miles from an ENT. 444 counties were identified as geospatial hotspots of increased travel distance in the Midwest, Great Planes, and Nevada with an average of 57.85 miles. 1231 counties in the Eastern US and Western Coast were identified as coldspots with a 9.77 mile average travel distance. Compared to these coldspots, hotspot counties were significantly more white (90.7% to 84.49%), less Black (1.96% to 11.90%), less likely to have a college degree (20.84% to 25.17%), with less median income (\$51,752.23 to \$59,696.43), less densely populated (6.33 to 581.49 people per square mile), and had less ENT specialists (0.01 to 6.94 ENT per county).

Access to care remains a critical issue across multiple healthcare specialties, ENT included. The severity of this problem, and those most impacted by it vary significantly throughout the United States. More efforts must be made in funding initiatives in the Midwest and Great Planes regions.

Adoption of Otolaryngologist-Head Neck Surgeons Toward Transoral Robotic Surgery: An International Survey

Stephane Hans, MD, PhD

Objective: To investigate perception, adoption and awareness of otolaryngologist-head neck surgeons (OTO-HNS) toward transoral robotic surgery (TORS).

Methods: An online survey was sent to 1,383 OTO-HNS on the perception, adoption and awareness about TORS to members of many otolaryngological societies. The following aspects were assessed: TORS access; training; awareness/perception; indications and advantages/barriers to TORS practice. The responses were presented for the entire cohort and regarding the TORS experience of OTO-HNS.

Results: A total of 359 completed the survey (26%); including 115 TORS surgeons. TORS-surgeons carry out a mean number of 34.4 annual TORS procedures. The primary barriers to TORS were the cost of the robot (74%) and disposable accessories (69%), and the lack of training opportunity (38%). The 3D view of the surgical field (66%), the postoperative quality of life outcomes (63%) and the shorter hospital stay (56%) were the most important benefits of TORS. TORS-surgeons believed more frequently that TORS is indicated for cT1-T2 oropharyngeal and supraglottic cancers than non-TORS surgeons ($p < 0.005$). Participants believed that the priorities for the future consisted of the reduction of the robot arm size and the incorporation of flexible instruments (28%); the integration of laser (25%) or GPS tracking based on imaging (18%), all of them to improve accesses to hypopharynx (24%), supraglottic larynx (23%) and vocal folds (22%).

Conclusions: The perception, adoption and knowledges toward TORS depend on the access to robot. The findings of this survey may help guide decisions on how improve the dissemination of TORS interest and awareness.

Airway Sequelae Post Covid-19: A Scoping Review

Estephania Candelo, MD, MSc; Jacobo Triviho, MS;
Felipe Quirzo, MS; Orianan Arias Valderrama, MD, MSc; Luis Fernando Tintinago, MD

Background: The epidemiology, morbidity, and burden of the disease related to airway sequelae associated with invasive mechanical ventilation (IMV) in the context of the COVID-19 pandemic remain unclear. This scoping review aims to describe current knowledge on the most frequently encountered laryngeal and/or tracheal sequelae in patients exposed to mechanical ventilation due to SARS-CoV-2 infection. This knowledge will help guide research endeavors and decision-making in clinical practice.

Methods: We identified observational studies in the following databases; PubMed, EMBASE, SCOPUS, EBSCO, Google Scholar, Cochrane Library, and Grey literature. A scoping review was conducted from 2020 to 2022 to identify those studies describing the airway sequelae post-COVID-19 infection. This scoping review was conducted from 2020 to 2022 to recognize those studies describing the airway sequelae post-COVID-19 infection.

Results: A total of 483 studies were identified, and 31 abstracts were evaluated. From these, 9 studies met the inclusion criteria. Of the 9 manuscripts, there were 2 cohorts, 2 case-control studies, 2 case series, 3 reviews. A total of 502 participants were analyzed, 71.9% male, median age 52 (interquartile range 51-55.5 years old). The majority of the population did not have any comorbidities. The most frequent airway disturbances were airway granuloma, vocal fold paralysis, and airway stenoses. A significant proportion of the population presented with dyspnea, dysphagia, and stridor.

Conclusion: This scoping review found a low incidence of airway sequelae post-COVID19. In the current literature, the most common laryngeal complications were airway granuloma, vocal fold paralysis, and airway stenoses. Future studies should evaluate the incidence of these disorders.

Amyotrophic Lateral Sclerosis and Otolaryngology Disturbances

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Srivatsa Surya Vasudevan, MD; Amy L. Rutt, DO

Background: Amyotrophic lateral sclerosis (ALS) is a fatal neurodegenerative disorder characterized by progressive degeneration of upper (UMN) and lower motor neurons (LMN). We aim to describe the most frequent otolaryngology (ORL) complaints and voice disturbances of patients with bulbar onset ALS.

Methods: This is a retrospective cohort of patients who have attended the ALS clinic and reported bulbar onset. A complete ORL evaluation was performed, which includes glottal functional index (GFI), voice handicap index (VHI), reflux system index (RSI), and voice quality characteristics such as jitter, maximum phonation time (MPT), and others.

Results: Fifty-six patients (age 62.7 ± 9.83 , 57.1% female) were included. Four patients were referred from the ORL department to the ALS clinic. The most frequent bulbar symptoms were dysphagia, facial weakness, pseudobulbar affect, and sialorrhea. The mean of force vital capacity was 62.7% SD 25.9, EAT-10 16.61 SD 11.7, RSI 20 SD 9.6, GFI 14.25 SD 5.9, VHI-10 17.25 SD 10.9, MPT 21.22 sec SD 10.5. A significant proportion of the patients reported voice impairments mainly related to spastic dysarthria, hypernasality, UMN and LMN dysarthria, reduced verbal expression, and articulatory accuracy. Abnormal shimmer and jitter were found at 6.93% SD 3.89 and 2.12% SD 0.60, respectively.

Conclusion: To our knowledge, this is the largest cohort of ALS with bulbar onset with reported voice, swallowing, and respiratory outcomes. Based on our cohort, this population with bulbar onset ALS has a higher frequency of voice disturbances that can be measured at the ORL clinic and further support the need for an early ALS specialist.

Analgesic Techniques in Transcutaneous Laryngeal Botox Injections: A Randomized, Crossover Trial

Richard Heyes, MD; William Karle, MD

Background: Transcutaneous transcricothyroid injection of Botox into the thyroarytenoid muscles is the most commonly performed treatment for adductor spasmodic dysphonia (SD). These injections can be associated with pain and there is an absence of data regarding methods to improve the patient experience during their performance. Local anesthetic is commonly used by practitioners prior to performing a Botox injection for SD. Within the facial plastics community, vibrating stimuli have shown evidence of improving the patient experience during similar invasive procedures of the face. The purpose of this study was to evaluate how lidocaine, using vibrating stimuli, or doing nothing affected the overall pain experienced by a patient with spasmodic dysphonia undergoing Botox injections.

Methods: This is an unblinded, prospective randomized control trial with a crossover design where, over three visits, each patient received transcutaneous transcricothyroid injection of Botox with no anesthesia, local anesthesia (2% lidocaine injection), and with the use of a vibrating wand. Patients were randomized to the order that they receive these treatments. Patients measured pain on a 0-10 visual analogue scale. Patients selected their preferred technique after receiving all three analgesic modalities.

Results: Thirty-seven patients were enrolled in the study. Thirty patients completed the study. Of these patients, 13 selected a preference for the vibrating wand, 10 preferred lidocaine, and 7 preferred no anesthesia.

Conclusion: Almost all patients tolerated laryngeal injection with any of the analgesic techniques studied. There is a trend towards patients preferring injection with a vibrating stimulus. Two thirds of patients selected a preference for a technique without local anesthesia.

Analysis of Factors Related to Termination in Laryngeal Cancer Clinical Trials

Travis Peng, BS; Matthew Saleem, BS; Felisha Li, BS; Tristan Tham, MD

Introduction: Laryngeal cancers represent a third of head and neck cancers and cause significant morbidity and mortality. Clinical trials regarding treatment of laryngeal cancer are of great importance because they explore novel drugs, devices, and radiation techniques to improve treatment for this condition. A deeper understanding of study characteristics of successful clinical trials for laryngeal cancer can point practitioners towards the right direction in treatment approach.

Methods: We queried Clinicaltrials.gov to identify completed and terminated trials related to laryngeal cancer. Trial characteristics including primary intervention, trial phase, funding source, intervention model, and primary purpose were collected as well as reason for trial termination. Using SPSS, univariate analysis by logistic binary regression was performed to determine predictors for trial termination.

Results: We identified 290 completed and terminated clinical trials related to laryngeal cancer between 1988 and 2020. There were 46 (15.9%) trials that were terminated before completion. Participant accrual difficulties was the most common reason for trial termination, as 19 (41.3%) of the terminated trials cited this reason. On univariate analysis, trials with a primary intervention of a drug were less likely to be terminated (OR = 0.21, 95% CI: 0.055-0.806, $p = 0.023$).

Conclusion: The results of our study demonstrate that patient accrual remains a challenging obstacle, accounting for the majority of laryngeal cancer clinical trial terminations. Additionally, trials that utilized a drug as the primary intervention were less likely to be terminated. Predictors of trial termination should be considered when designing future studies for laryngeal cancer.

Assessing the Effect of Oral Steroid on Voice Recovery Time and Swallowing Function Following Injection Laryngoplasty for Glottic Insufficiency

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Rupali Shah, MD; Robert Buckmire, MD

Objectives: Prophylactic steroid dosing following injection laryngoplasty is common practice in clinical laryngology. However, little data exists to support the efficacy of this practice. This study was designed to evaluate the efficacy of prophylactic methylprednisolone in altering the course of postprocedural subjective and perceptual voice quality as well as patient reported swallowing function following injection laryngoplasty.

Methods: A longitudinal, single-site, prospective cohort study that assigned patients to a control group (n=9) or methylprednisolone intervention group (n=8). Post-operative surveys including Glottal Function Index (GFI), perceptual Grade, Roughness, Breathiness, Asthenia, and Strain (GRBAS) measures, and Eating Assessment Tool EAT 10 scores were compared between the two groups at specific post-procedural time points: (Days 1,4, 7, 10, 14, 21, and 28).

Results: Longitudinal GFI scores were statistically higher in the intervention group [6.84 vs. 11.08, p=0.045]. The average change in GFI score over 28 days was not different between the two groups [p=0.84]. The average change in EAT-10 scores were higher in the control group compared to the intervention group [5.67 vs. 4.08, p=0.03]. Lastly, changes in GRBAS scores did not differ between the two groups [p=0.72].

Conclusion: Our data suggest that prophylactic methylprednisolone following injection laryngoplasty does not positively impact the course patient's subjective voice quality or perception of swallowing function.

Chemical Characterization of E-Cigarette Vapor for a Mouse Model of Inhalation Exposure

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Joshua Martinez, MS; Joanne Soo, MD

Background: E-cigarettes (e-cigs) are a newer and less well understood inhalation agents, with increasing uptake in youth. Early animal studies indicate possible cellular and molecular laryngeal effects of e-cig use, however the constituents of e-cig vapor, and what possibly could be driving these changes is not well understood.

Objective: We aim to characterize the chemical constituents of the e-cig vapor from two popular products, JUUL mango and JUUL mint.

Methods: During animal experiments, e-cig mice are exposed for 2 hours/day, 5 days/week using the inExpose™ inhalation system, while control mice remain in room air conditions. Samples of e-cig vapor from JUUL mango (N=3) and mint (N=3) were collected using real time tedlar gas sampling. This was analyzed with ion flow mass spectrometry to generate an e-cigarette toxicant profile and we compared the e-cig vapor profile to air.

Results: Body weight was significantly lower in the JUUL mint group compared to controls and JUUL mango group. An e-cig chemical panel was generated for JUUL mango and mint flavors, with concentrations of formaldehyde, 1,2-propanediol, 2-butenal, acetaldehyde, acrolein, benzaldehyde and nicotine described. The levels of formaldehyde were 2-55x the minimum risk level and acrolein were 4-275x the minimum risk level, as per the Agency for Toxic Substances and Diseases Registry (ATSDR).

Conclusions: The preliminary results of the chemical constituent analysis of e-cigs include the presence of known carcinogens at greater than minimum risk levels. The potential risk profile of these specific agents on laryngeal health warrant further investigation.

Clinical and Anatomical Variation During Assessment of Maximum Glottic Angle

Ethan Frank, MD; Daniel DeChance, BS;
WayAnne Watson, MD; Brianna Crawley, MD

Background: Glottic abduction is used to quantify laryngeal function and assess success of interventions; however, measurement consistency across time has not been established. This study assesses the consistency of glottic abduction measurements across visits in healthy patients and anatomic factors impacting these measurements.

Methods: Review of patients with serial stroboscopy over six months from 2021-2022. Images of maximal glottic abduction were captured and uploaded into ImageJ. Cadaver heads were used to assess the impact of visualization angles on glottic measurements. A monofilament was inserted into the supraglottis of each cadaver as a point of reference. Laryngoscopy was performed through both nostrils with the laryngoscope advanced to the monofilament to control distance from the glottic aperture. Images of the glottic angle were measured using ImageJ. Comparisons were done with a paired T-test.

Results: Twenty-five stroboscopic and 13 cadaveric examinations were evaluated. The mean difference between maximum glottic angles across visits was 2.49° ($p=0.087$, range -8.62° - 20.1°). Glottic angle increased in fifteen patients (60%) and decreased in ten (40%). Seventy-two percent (18/25) of patients saw a $>5\%$ change in angle. In cadaveric exams, the mean absolute difference between measured glottic angles was 0.831° ($p=0.711$, range 0.2° - 12.1°).

Discussion: While maximal glottic abduction angles do not vary statistically, they may differ to a clinically significant degree. Factors contributing to differences in measurement of maximum glottic abduction angles include the position and angulation of the laryngoscope, and changes in patient positioning, leading to different viewing windows between laryngoscopic examinations.

Comparative Histoanatomy of the Epiglottis and Preepiglottic Space of the Hominid Larynx

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Fumihiko Sato, MD; Shun-ichi Chitose, MD; Hirohito Umeno, MD

Objectives: Adequate understanding of the evolution of the larynx clarifies the physiology and functional histoanatomy of the present-day human organ. This study investigated the comparative histoanatomy of the epiglottis and preepiglottic space of the chimpanzee larynx (a hominid, phyletic closest relative of humans).

Methods: Two normal adult chimpanzee larynges obtained from natural deaths were investigated. The whole organ serial section technique was employed.

Results: The histoanatomical structures of the chimpanzees' epiglottis and preepiglottic space were considerably similar to those of human adults.

The chimpanzees' epiglottic cartilage was relatively thin and composed of elastic cartilage indicating that the chimpanzee epiglottis is flexible and plays the role of retroflexion.

The chimpanzees' larynges had a preepiglottic space composed of adipose tissue and loose elastic and collagen fibers. Epiglottic cartilage was connected to the thyroid cartilage anteroinferiorly with an intervening thyroepiglottic ligament and to the hyoid bone anteriorly with an intervening hyoepiglottic ligament.

These histoanatomical structures of the epiglottis and preepiglottic space reflect the fact that chimpanzees have a descended larynx and acquire the pharyngeal space of the vocal tract.

Conclusions: The results of this study are consistent with the hypothesis that, in the process of evolution, the histoanatomical structures of epiglottis and preepiglottic space change to make the larynx descend and lengthen the pharyngeal space of the vocal tract for speech production in humans. Moreover, the distribution of the human preepiglottic space likely allows the epiglottis to more effectively play the role of retroflexion during swallowing in order to prevent aspiration.

Comparing Cadaveric and 3d-Printed Laryngeal Models for Medical Education in Transcutaneous Injection Laryngoplasty

Megha Chandna, BS; Sana H. Siddiqui, MD;
Dylan Bertoni, MD; Joseph R. Spiegel, MD

Background: There is increasing focus on the development of high-quality simulation models for medical education. Cadaveric models, although considered more realistic, may be difficult to obtain and costly. The advent of 3D printing has offered a low-cost, reliable, and reproducible alternative. This study sought to compare the utility of 3D-printed, open-source models to cadaveric models for training in transcutaneous medialization injection laryngoplasty.

Methods: A simulation course with a cross-over design was employed. Video laryngoscopes were utilized for both the 3D and cadaveric models to assess accuracy of injection into the vocal fold. Pre-procedure and post-procedure surveys were administered to evaluate understanding and comfort level on a Likert scale of 1-10. Each model was also rated on a 1-5 Likert scale for self-efficacy, fidelity and educational value to compare face and content validity.

Results: Pre- and post-survey data was completed by 15 otolaryngology residents and medical students. Mean pre-seminar understanding and comfort level were 3.7 and 2.2 respectively, compared to 6.9 and 5.9 ($p < 0.05$) following use of the 3D model and 6.4 and 4.7 ($p < 0.05$) following use of the cadaver model. When comparing 3D and cadaveric models, no significant differences were observed regarding self-efficacy, fidelity and educational value.

Conclusion: There was a similar mean increase in understanding and comfort following use of the 3D and cadaveric models. 3D-printing can provide an excellent adjunct to, and eventually a potential replacement for hands-on cadaveric training in medical education, particularly for transcutaneous injection laryngoplasty.

Comparing Intra-Operative and In-Office Intralesional Steroid Injections for Idiopathic and Autoimmune Subglottic Stenosis Treatment: A Single Centre Large Retrospective Review

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Introduction: Intra-lesional corticosteroid injections for management of subglottic stenosis (SGS) is thought to improve patients' surgery free intervals (SFI). The objective of this study was to determine the difference in SFI between SGS patients treated with endoscopic dilation alone, dilation with a single intra-operative intra-lesional corticosteroid injection, or dilation with intra-operative steroid injection followed by serial in-office serial intralesional steroid injections (SILSI) procedures.

Methods: Retrospective review of patients with idiopathic and autoimmune SGS from 1/1/2012 to 1/1/2022. The SFI was calculated as the time between surgical interventions and one-way ANOVA used to compare the difference in SFIs between treatment groups. The difference in SFI for individual patients before and after steroid injection was compared with paired t-tests.

Results: A total of 451 procedures were included in this study, performed on 156 patients. Of these procedures, 178 involved no steroid injections (mean SFI=496, SD=218 days), 216 involved intra-operative injection of steroids (mean SFI=510, SD=305 days), and 57 involved post-operative SILSI (mean SFI=615, SD=261 days). Based on one-way ANOVA, there was no statistically significant change in SFI between treatment groups ($p=0.197$). Considering SFI among patients who converted from no adjuvant treatment to steroid injections, we found an increase of 169 days following SILSI implementation, though this difference was not statistically significant, $p=0.171$.

Conclusion: In this population of patients with SGS, short course injection of corticosteroids, whether intraoperatively or SILSI, does not correlate with a statistically significant increase in SFI. Further research is required to evaluate the efficacy of these treatment regimens.

Correlation between Laryngoscopic Appearance and Histopathology in Vocal Fold Cysts

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Lucian Sulica, MD

Introduction: Cysts are benign vocal fold lesions typically divided into mucus retention or epidermoid subtypes. The conventional paradigm that the former are translucent and the latter opaque fails to encompass the heterogeneity of cyst appearance on laryngoscopy. This study aims to characterize the relationships between clinical cyst characteristics and histopathology.

Methods: Clinicodemographic data, videostroboscopy findings, and histopathology results were retrospectively reviewed for adults who underwent surgical excision of vocal fold cysts at our institution between 2006 and 2021.

Results: Diagnostic histopathologic material was available for 56 patients (age: 50.3 ± 15.1 years, 67.8% female). Clinically, most cysts were opaque (68.7%), located at the vibratory margin (84.3%), and without surrounding inflammation (78.3%). 11.6% were infraglottic in position. Cyst opacity did not correlate with histopathology ($p=0.415$). Epidermoid cysts were more likely to exhibit clinical inflammation ($p=0.002$).

Conclusions: 1. Conventional clinical cyst descriptions do not appear to correlate with histopathology. 2. Clinical signs of inflammation are significantly more common with epidermoid cysts.

Current Practices in Voice Data Collection and Limitations to Multi-Institutional Voice AI Research: A National Survey

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Introduction: Accuracy and validity of voice AI algorithms relies greatly on copious amounts of quality voice data. Although commensurable amount of voice data is captured daily in voice centers across north America, there is no standardized protocol for acoustic data management, which limits the usability of these datasets for voice AI research.

Objective: To capture current practices of voice data collection, storage, analysis, and perceived limitations to collaborative voice research.

Methods: A 30-question online survey was developed with expert guidance from the voicecollab.ai members, a collaborative of voice AI researchers. The survey was disseminated via REDCap to a list of North American academic voice centers. Survey questions assessed respondents' current practices in terms of acoustic data collection, storage, and retrieval as well as limitations to collaborative voice research.

Results: 72 respondents completed the survey, 81.7% were laryngologists and 18.3% were speech pathologists. 18% of respondents reported seeing 40-60 and 55% reported seeing >60 patients with voice disorders weekly (conservative estimate of over 4,000 patients/week). Only 28% of respondents report utilizing standardized protocols for collection and storage of acoustic data. While 87% of respondents conduct voice research, only 38% of respondents report doing so on a multi-institutional level. Perceived limitations to conducting collaborative voice research include lack of standardized methodology for collection (30%) and lack of human resources to prepare and label voice data adequately (55%).

Conclusion: To conduct large-scale multi-institutional voice research with AI, there is a pertinent need for standardization of acoustic data management, as well as infrastructure for secure and efficient data sharing.

De Nova Granuloma of the Membranous Vocal Fold: A Marker of Occult Disease

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Introduction: De novo occurrence of granuloma (granulation tissue) on the membranous vocal fold is unusual and not readily explained by causative factors typical for vocal process lesions such as gastroesophageal reflux, intubation, and/or collisional trauma. We describe a series of patients with this presentation.

Methods: Cases were identified from a single academic institution over 13 years. All patients exhibited granulation tissue on pathology. Demographic details, presentation, treatment, histology, and clinical outcomes were recorded.

Results: Eight patients were identified (mean age: 74.1 ± 5.4 years, 62.5% male, 62.5% former smokers). Initial biopsy or excision revealed invasive or in-situ squamous cell carcinoma (SCC) in two patients. Persistent or recurrent granulation led to repeat biopsy or excision an average of 983.2 days later in six patients, revealing a new diagnosis of SCC in-situ in one patient. Further persistence or recurrence led to a third biopsy or excision an average of 214.7 days later in three patients, demonstrating invasive and in-situ SCC in two. Overall, invasive or in-situ SCC were diagnosed in 5 of 8 patients. An average of 2.5 biopsies were required with a mean time to diagnosis of 435 days from presentation.

Conclusions: Occurrence of granuloma on the membranous vocal fold should raise concern for malignant or premalignant disease. This concern should persist even after a negative biopsy. Because of the high risk of occult malignancy, patients should remain under surveillance over the long-term, with low threshold for repeat tissue sampling for any recurrence of granulation.

Delayed Development of Surgical Site Infection after Arytenoid Adduction and Laryngeal Medialization Implant

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Background: The aim of the study was to present a case of delayed infectious complication of an arytenoid adduction (AA) and medialization laryngoplasty implant after a previously uncomplicated post-operative course, a rare finding with few cases in the published literature.

Methods: Case report.

Results: A 64 year-old male with a history of HIV infection underwent a successful arytenoid adduction and medialization laryngoplasty for unilateral vocal fold paralysis using a Gore-Tex implant. Close to a year after surgery, he presented with a neck abscess, mild stridor due to arytenoid edema, and significant erythema of the right vocal fold. Surgical exploration revealed an abscess pocket directly over the site of the laryngoplasty window. Removal of the laryngeal implant and drainage of the abscess pocket revealed an unexpectedly minimal amount of purulent exudate, indicating that infection originated elsewhere besides the paraglottic space. Cultures grew bacteria common to the oral cavity. These findings suggested that the nidus for infection was a fistula formed due to mucosal microperforation from the AA suture. One month post-operatively, the patient reported improved voice quality and decreased odynophagia with unremarkable post-operative visits.

Conclusions: Delayed complications of arytenoid adduction and medialization laryngoplasty are rarely reported in the literature. This case illustrates an unusual presentation of a delayed surgical site infection following a standard arytenoid adduction and laryngeal implant placement in an immunocompromised patient one year after surgery, resulting in laryngeal implant removal, with an otherwise unremarkable post-operative course.

THE EUGENE N. MYERS, M.D. INTERNATIONAL PAPER IN LARYNGOLOGY AWARD
Derivatives of F0 on Voice Gender Recognition by Machine Learning Models
Across Different Languages and Noisy Environments

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Background: Fundamental frequency, and its derived statistical measures, has been described as a common acoustic feature to determine voice gender. However, many intrinsic variables such as age, ethnicity and spoken language amongst others can impact f0 and its ability to predict voice gender.

Objective: The objective of this study was to determine which features had the greatest impact on gender recognition by ML models in a consistent manner across languages and noisy environments.

Methods: The dataset was extracted from the Mozilla Common Voice Corpus 10.0. Eight acoustic measures related to pitch (minimum, maximum, quartiles, mean, median, interquartile range and standard deviation) were extracted and analyzed using two ML algorithms and logistic regression model. Voice data was stratified by age, gender (male/female) and language spoken (English, Spanish, French, Chinese, German, and a mixed dataset of all of them).

Acoustic features were calculated based on an acoustic periodicity detection algorithm. Waikato Environment for Knowledge Analysis Software (WEKA, version 3.8.6) was used for machine learning (ML) analysis with two classifiers, multilayer perceptron, J48 decision tree, and a logistic regression.

Results: A total of 1,910,100 voice samples from 4,900 unique speakers were analysed. The ML models reached high accuracy and F1 measure in detecting voice gender (above 92.21%). Across all 8 acoustic features studied, features that impacted accuracy the most across all languages were first and third quartile, mean and median.

Conclusion: This study demonstrates the effect of spoken language on accuracy of gender recognition by machine learning algorithm. As voice is becoming a biomarker and used for identification,

Developing an Automated Perceptual Evaluation of Voice: Patient Characteristics of Children with Supraglottic Phonation After Laryngotracheal Reconstruction

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Background: Children who have undergone airway reconstruction for correction of congenital and/or acquired laryngotracheal stenosis often develop post-operative dysphonia with glottic, supraglottic and/or mixed vibratory sources. Patients using supraglottic phonation have voicing that is characterized by significant variability with worse overall severity, roughness and strain compared to glottic phonation. This study highlights characteristics of children who rely on supraglottic phonation after laryngotracheal reconstruction.

Methods: Data were collected for children evaluated in the Cincinnati Children's Hospital Medical Center for Pediatric Voice Disorders Clinic from 2008 - 2022. A REDCap database containing this information was queried to isolate patient-, surgical-, and voice measure-specific characteristics for children using supraglottic phonation.

Results: One hundred sixty four children with supraglottic phonation were identified. Patients were primarily male (55%) and aged 4- to 11-years-old (mean 7.15 years, standard deviation [SD] 2.21). Voice acoustic signal types I (65%) and II (35%) were included. Mean Pediatric Voice Handicap Index (P-VHI) score was 32 (range 0 – 90, SD 17.5) and maximum phonation time ranged from 0.3 – 25 seconds (mean 5.84 seconds, SD 3.46). Overall severity as measured by Consensus Auditory Perceptual Evaluation of Voice (CAPE-V) scores ranged from 0 – 96 (mean 43, SD 25).

Conclusions: There is significant variability in the quality of supraglottic voicing in children who have undergone laryngotracheal reconstruction. Development of an automated tool to provide objective measures of post-surgical voice function is underway to promote streamlining of care and optimization of vocal rehabilitation in these complex patients

Direct Transvestibular Feminization Laryngochondroplasty – Surgical, Functional and Cosmetic Outcomes

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Introduction and objective: Feminization thyroid laryngochondroplasty (FLC) is performed in transgender females to feminize the neck. Recently, we suggested a direct transvestibular FLC (DTV-FLC) approach, which enables scarless FLC without the need for sophisticated surgical equipment. In this study, we present the surgical, functional and cosmetic outcomes of the first 15 cases.

Methods: The medical records of the first 15 consecutive patients to undergo DTV-FLC from December 2019 to July 2022 were retrieved and reviewed for this retrospective cohort study. Data on the operative, postoperative and follow-up courses, complications, and functional and cosmetic results were retrieved.

Results: Five patients underwent isolated DTV-FLC and ten underwent DTV-FLC combined with lower third facial feminization surgery. One case was a revision of endoscopic transvestibular FLC. Vocal fold motion, swallowing and voice quality remained intact. Only transient minor, resolving complications were encountered. Thirteen patients were satisfied with the cosmetic result, one was dissatisfied (the revision surgery patient), and one was lost to follow up.

Conclusions: The novel DTV-FTLC approach either in isolation or as part of lower-third facial feminization surgery facilitated scar-free FLC with satisfactory cosmetic and functional results.

Does Vocal Fold Pathology Play a Role in Determining the Timeline of Presentation to an ENT Surgeon?

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Background: The primary objective is to study the average time duration between onset of vocal symptoms and presentation to an ENT surgeon, in different vocal pathologies.

Our second objective is to study gender distribution among various pathologies.

Methods: Our voice clinic records were retrospectively reviewed for 1 year, from August 2022, for details regarding gender, and the average time taken for presentation (ATTFP), in months, to an ENT surgeon. Disorders were grouped into vocal fold nodules, polyp, cyst, palsy/paresis, sulcus, spasmodic dysphonia (SD), premalignant and malignant conditions.

Results: A total of 17 patients of vocal fold nodules (15 females), 47 vocal fold polyp patients (45 males), 40 vocal fold cyst patients (24 females), 64 palsy/paresis patients (44 males), 41 sulcus patients (31 males), 35 SD patients (22 females), 65 premalignant and malignant condition patients (51 males) presented to us. The ATTFP for nodules was 8.1 months, 6.8 months for polyps, 10.2 months for cysts, 22.8 months for idiopathic and 6 months for other causes of palsy/paresis, 32.4 months for sulcus, 26.1 months for SD and 10.2 months for premalignant and malignant conditions.

Conclusion: Sulcus patients took the longest time to present to an ENT surgeon, followed by SD patients, both groups averaging over 2 years. Vocal fold paralysis/paresis patients of a non-idiopathic diagnosis were earliest to present. A high male preponderance in vocal fold polyps (96%) as opposed to a high female preponderance in vocal fold nodules (88%), both considered phonotraumatic lesions, warrants further research into possible varying etiopathogenesis.

Effect of Nasal and Laryngeal Endoscopy with and without Topical Anesthesia on Patient's Evaluation of Otolaryngology Physician

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Andrew Kwok, BA; Tam Ramsey, MD; Jessica Scordino, MD

Objective: Nasal and laryngeal endoscopy is an integral part of the otolaryngology exam but can cause significant discomfort to patients. The aim of this study is to identify the effects of endoscopy on patient satisfaction and evaluate the necessity of topical anesthesia before endoscopy.

Methods: Anonymous patient satisfaction surveys were administered at an outpatient facility to be filled on after their scheduled appointment. Aggregate survey data was evaluated using paired 2-tailed T tests, Mann Whitney Tests, chi square analysis, and Fisher's Exact tests.

Results: 150 patients completed surveys, 112 of whom received an endoscopy exam that visit. Of the 112, 77 received topical anesthesia prior to examination. Patient satisfaction with the visit and perception of the physician were not significantly different between those with and without topical anesthesia ($p < 0.05$). Most patients identified the endoscopic exam as a necessary part of their care and did not feel significant discomfort (54%). However, 53% of patients receiving topical anesthesia reported some discomfort versus 31% of those without ($p = 0.039$). Finally, 90% of analgesia-treated patients would continue to prefer analgesia for the next, compared to only 43% of patients not treated with analgesia ($p = 0.0001$).

Conclusion: Patient satisfaction and perception of the physician is not significantly influenced by receiving endoscopic exam or administration of topical anesthesia during the exam. In addition, topical anesthesia may not provide improved comfort for patients during endoscopy. Patients should be trialed on endoscopic examination without analgesia to reduce discomfort, and potentially save time and resources in clinic.

Efficacy of Steroids in the Prevention of Hypersensitivity Reactions following Vocal Fold Injection Augmentation

Chris Walz, MD; Matthew Hoffman, MD, PhD; Edie Hapner, PhD, CCC-SLP; Blake Simpson, MD

Background/Objectives: Hyaluronic acid-based injectables are commonly used for vocal fold injection augmentation. As with any injectable, there is a risk of hypersensitivity. This study evaluates if routine prescription of steroids can reduce the rates of hypersensitivity reaction compared to a historical control group that did not receive steroids.

Methods: Charts were reviewed of 85 patients who received injection augmentation of the vocal fold(s) with hyaluronic acid-based filler, followed by post-injection steroids, over a 27-month period at the University of Alabama-Birmingham Medical Center. Many patients received bilateral injections, leading to a total of 114 total vocal folds injected. The presence or absence of vocal fold edema and erythema on post-injection visualization was recorded at post-op visits, and hypersensitivity reaction rates were calculated. A Fischer's exact test compared proportion of patients with hypersensitivity to a historical control group not receiving steroids, where 7 of 186 patients had a reaction.

Results: 4 of 85 patients (4.7%) had a hypersensitivity reaction noted on exam within 31 days of injection. 2 patients received a standard Medrol dose pack steroid taper. 2 patients received a prednisone course consisting of 60 mg daily for 5 days followed by 5-day taper. There was no difference in rate compared to the historical control ($p=0.7449$).

Conclusions: The addition of oral steroids in the immediate post-injection period does not decrease the rate of post-injection hypersensitivity reaction. Potential for inflammatory reaction should be included as part of patient counseling. Alternative prophylactic strategies including antibiotic regimens could be explored.

Environmental Sustainability: Comparison Waste Audit Between in Office and Operating Room Laryngeal Surgery

Jennifer Anderson, MD, MSc

Background: Operating room activity produces between 30-70% of hospital waste. Trends towards in office procedures for treatment of laryngeal pathology has shown to be cost effective. However, environmental sustainability benefits have not been investigated including opportunities for waste reduction or green initiatives.

Methods: Waste audit was conducted with associated costs for ten in office and ten in OR laser laryngeal procedures. The waste was divided into five main streams : non recoverable, recyclable paper, recyclable plastic , clinical waste and sharps.

Results: The total waste produced was dramatically lower (75%) in the in office procedures cases. We identified that the contamination rate in recyclables was minimal however, 45% of possible recyclable materials were not being recovered in the OR and 0% recycling was being done in the in office setting. Costs of waste were similarly dramatically less in office procedures.

Conclusion: Environmental impact as well as costs associated with laryngeal laser surgery is vastly reduced in office procedures although several targeted initiatives were identified to enhance waste reduction.

Esocheck And Esoguard– BNA Based Lower Esophageal Biopsy as Adjunct for Transnasal Esophagoscopy – An Introduction to a New Technology

Craig Zalvan, MD

The rise in fellowship trained laryngologists brings new skill sets and technology to the care of voice and swallowing disorders. Transnasal Esophagoscopy (TNE) is an office-based, non-sedated tool that empowers our field to further diagnose disorders of voice, cough, swallowing and reflux disease. TNE can visualize anatomic abnormalities, esophagitis and tumors. Biopsy can be performed with a cup forceps, though smaller caliber than standard gastroenterology forceps. Brush biopsy can be performed as well. Both are subject to sampling error. A new technology, Esocheck and Esoguard, utilizes a balloon system that is deployed in the stomach and pulled through the lower esophagus, circumferentially removing superficial cells which are then examined for changes in DNA methylation with high sensitivity and specificity for dysplasia through malignancy. A review of this technology, how it is applied in practice, and preliminary experience will be discussed.

Methods: Digital images of this new procedure will be presented detailing the process of balloon capsule delivery and deployment in the stomach, retraction through the lower esophageal sphincter and lower esophagus and processing of the sample.

Results: Of 77 tests performed, 9 were positive (12%), 6 were “quantity not sufficient” (8%), and 62 were negative (81%).

Discussion: This poster presents Esocheck and Esoguard as a compliment to TNE for accurate office-based detection of dysplasia, Barrett’s or esophageal adenocarcinoma. The unique design of the collection device allows for circumferential sampling and decreases sampling error ensuring a high degree of screening in the otolaryngologist’s office setting.

Evaluating the Effectiveness of UV Smart D60 in Reducing Contamination of Flexible Laryngoscopes Used in Otolaryngology

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Objectives: The objective of this study was to investigate whether UV light was as efficacious as standard reprocessing procedures in disinfecting contaminated non-channeled flexible laryngoscopes (FL).

Methods: This study was performed on a total of 199 FLs. After clinical use, scopes were either reprocessed using water-based pre-cleaning in conjunction with high-level disinfection (HLD) using UV Smart D60 technology (UV) (n=100) or enzymatic pre-cleaning and HLD using Cidex OPA solution (SOC) (n=99). Bacterial contamination was tested for each FL. Nonparametric analysis was conducted using SPSS 28.0.0.0 (IBM). This study was done with the support of UV Smart.

Results: Of the 199 FLs collected prior to reprocessing, 111 of them were contaminated (55.8%). The average microbial load after clinical use was $7159.5 \text{ CFU/mL} \pm 57,896.4$. We observed a 100-fold reduction in bacteria after water pre-cleaning, followed by a 10-fold reduction after UV light HLD (n=40). Only 8% of FLs grew organisms after UV reprocessing, (mean: $7.2 \text{ CFU/mL} \pm 56.4$; n=100); 9% of FLs grew organisms after SOC reprocessing (mean: $1.1 \text{ CFU/mL} \pm 3.8$; n=99). FLs reprocessed by both cleaning methods had significantly reduced CFUs ($p < 0.01$), and there was no significant difference in efficacy between the UV method and the standard method ($p > 0.05$).

Conclusion: Our study demonstrates that water-based pre-cleaning and HLD with UV light can reduce the bioburden of bacterial organisms on used ENT FLs as effectively as manual reprocessing using enzymatic detergent and Cidex HLD.

Evolving Endotracheal Tube Preferences and Practices: Intensivist Knowledge Gaps and Related Sex Disparities

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Logan McColl, MD; Kyle Enfeild, MD; Robert H. Thiele, MD; James J. Daniero, MD

Introduction: The complex management of intubation-related laryngeal injury makes prevention vital. The purpose of this study is to assess endotracheal tube (ETT) practices and preferences among intensivists at our institution.

Methods: Chart review of intubated patients and intensivist survey were simultaneously performed in January 2016 and August 2022. A height to ETT size ratio was calculated for each patient in the 2022 cohort. Intubated patients were followed until tracheostomy, extubation, or death occurred. Surveys assessed intensivist preferences for ETT size and management of intubated patients.

Results: 300 ICU patients were included. The mean ETT size for males decreased from 7.73 ± 0.30 in 2016 to 7.57 ± 0.25 in 2022 ($p < 0.001$). The average H:ETT of men was higher than females ($p = 0.004$), indicating that females in this population were intubated with larger ETTs relative to their height compared to males. While the majority (66.7%) of intensivists endorse 7.0 ETTs as standard for women, the majority (70%) of women at our institution are intubated with a 7.5 ETT or larger. Of intubated patients in the ICU, 23 (19.5%) were intubated 11 days or longer.

Conclusions: Compared to men, women are intubated with larger-than-preferred ETTs relative to height. Additionally, patients in our study were intubated for longer than preferred based on intensivist surveys, putting this population at higher risk for ALGI-related LTS. Further studies should seek to identify similar trends and barriers to reducing ALI-related LTS.

Extruded Screw from Cervical Spine Hardware Causing Vocal Fold Paralysis

Meriam Deeb, BS; Keith Conti, MD; Aaron Jaworek, MD

Background/Objectives: Dysphonia affects over 40% of the population at least once in their lifetime. Vocal fold paresis/paralysis are one of many causes of dysphonia. More common etiologies of vocal fold paresis/paralysis include iatrogenic from surgery and intubation, trauma, neoplasms, and neuromuscular disorders. Head and neck surgery etiologies include thyroidectomy and anterior cervical spine surgery.

Methods: We present a case of a 63-year-old woman who presented to a tertiary otolaryngology office with gradual onset dysphonia and dysphagia for the past 3 months.

Results: The patient's past medical history was significant for a motor vehicle accident in 2010 resulting in right arm radiculopathy and subsequent anterior cervical discectomy with spinal decompression and fusion (ACDF) at C5-C6 and C6-C7 approximately 1 year later. Computed tomography of the neck and chest were ordered which showed a screw from the c-spine hardware had migrated approximately 2 cm from its expected location to the tracheal-esophageal groove. An incidental right thyroid nodule was discovered with fine needle aspirate confirming suspicion for thyroid malignancy. The patient underwent right neck exploration, right hemithyroidectomy, and microdirect laryngoscopy with vocal fold injection laryngoplasty. Intraoperatively, the metal screw was identified and noted to be embedded within the right recurrent laryngeal nerve (RLN). The screw was carefully dissected. Her voice and swallow improved markedly and has remained stable for more than 5 years.

Conclusions: Our case reports a very rare instance of vocal fold paralysis by which an extruded screw from ACDF hardware migrated and became embedded within the RLN nearly 5 years after the procedure was completed.

Glycolytic Metabolism of the Tissue Stem Cells in the Maculae Flavae of the Human Vocal Fold

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Shun-ichi Chitose, MD; Kiminori, Sato, MD, PhD; Takashi Kurita, MD;
Hirohito Umeno, MD

Background/Objectives: It is becoming clear that metabolic programs in the stem cells are essential for maintaining homeostasis and protecting against aging. Our previous studies observed that the glycolytic programs of the tissue stem cell in the human maculae flavae seem to rely more on anaerobic glycolysis for energy supply in comparison with oxidative phosphorylation. However, previous studies showed only the metabolic enzymes of glycolysis and functional morphology of the mitochondria, that is, it has not yet been determined whether anaerobic glycolysis actually took place. The purpose of this study is to investigate the glycolytic metabolites of the cells in the maculae flavae of the human vocal fold in vitro.

Methods: Four normal human adult vocal folds obtained from surgical specimens were used. After extraction of the anterior maculae flavae under microscope, the maculae flavae were minced, cultured and proliferated. We assessed immunocytochemistry and measured the metabolites of the glycolysis.

Results: The cells of in the maculae flavae expressed glucose transporter-1 in the cytoplasm and the cell membranes using immunocytochemistry. In addition, the cultured cells produced lactate (the final metabolite of anaerobic glycolysis) and NADPH (the metabolite of the pentose phosphate pathway).

Conclusions: The presence of glycolytic metabolites in the cells of the maculae flavae of the human vocal fold in vitro is consistent with the hypothesis that the tissue stem cells in the maculae flavae of the human vocal fold rely more on anaerobic glycolysis by the pentose phosphate pathway without oxidative phosphorylation.

Guide to Repair of Cricothyroid Avulsion with Disruption of Broyles Ligament

Hayden Guidry, BS; Colleen Cecola, MD; Laura Pelaez, MD

Introduction: While cricotracheal separation is well documented in laryngeal trauma guides, cricothyroid separation along with avulsion of the anterior commissure is not widely reported. There are several reviews and techniques describing the former phenomenon. Here we present a case of a 47-year-old male after high-speed motorcycle collision in which he suffered blunt laryngeal trauma resulting in cricothyroid separation and Broyles ligament avulsion.

Procedure: The patient was initially taken for diagnostic direct laryngoscopy given findings of pneumomediastinum and radiologic thyroid cartilage fracture, during which an aperture was noted anterior to the vocal cords. Procedure was converted to transcervical repair of the defect with tracheostomy. Direct examination of the thyroid cartilage revealed midline hairline fracture, which later fragmented, and the vocal cords were found to be protruding through the cricothyroid membrane defect with inferior displacement of the cricoid cartilage. Permanent sutures were utilized to resuspend Broyles ligament to the thyroid cartilage after being plated and to reapproximate the cricoid and thyroid cartilages.

Results: The patient had an uncomplicated postoperative course and was able to ventilate spontaneously via tracheostomy following the procedure. On postoperative laryngoscopy, the patient had recognizable laryngeal anatomy and mobilization of the vocal cords was visualized. Prior to discharge, the patient was able to phonate and swallow safely.

Statement of conclusion: We hope to present a successful repair of cricothyroid avulsion to document techniques and post-operative practices for use in future laryngeal traumas.

Idiopathic Vocal Process Granulomas: A National Survey of Academic Laryngologists

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Objectives: Vocal process granulomas (VPG) are benign laryngeal lesions that manifest as ulcerated regions of the vocal fold or nodular polypoid lesions. Standard treatments for idiopathic VPG (iVPG) have not been identified at this time. This study evaluated clinical decision-making and outcomes in the treatment of iVPG patients based on experiences of academic Laryngologists across the United States.

Methods: A 21-question survey was developed to evaluate each respondent's specific iVPG patient population, clinical decision making in treating VPG, and corresponding treatment outcomes. The survey was distributed to 168 laryngologists at academic institutions across the US. Data was analyzed through the Qualtrics platform.

Results: A total of 101 responses were analyzed, with a completion rate of 60.1%. Etiology of iVPG was most commonly attributed to phonotrauma (96.2%) and laryngopharyngeal reflux (71.8%). Primary first line treatment was most commonly antireflux medications (90%). Other common first line treatments included voice therapy (58.8%) and inhaled steroids (42.5%). With these treatments, the majority of laryngologists report that recurrence is uncommon (68.4%), with dysphonia cited as the most common long-term sequelae at 27.8%.

Conclusions: iVPG treatment continues to be controversial across the US with many treatments described in the literature with variable application in the practice of academic laryngologists today. Based on survey results, antireflux medications and voice therapy may be the most widely used and most effective treatment options. Establishment of gold standard therapy for iVPG as well as further research into recurrent or persistent VPG despite antireflux and voice therapy should be explored.

In Vivo Visualization and Quantification of Laryngeal Blood Supply after Changes in Hydration Status in a Rat Model

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Craig Goergen, PhD; Preeti M. Sivasankar, PhD

Objectives: Although there is broad consensus that systemic dehydration decreases total body blood volume, hemodynamic alterations at the level of local organs, such as the larynx, remain unclear. Rats underwent in vivo magnetic resonance angiography (MRA) and ultrasound imaging to understand blood supply changes to the larynx after dehydration and rehydration.

Methods: Male Sprague Dawley rats (N = 10) were systemically dehydrated (3-day water withholding) and then rehydrated (5 days of unrestricted access to water) in a prospective, repeated measures design. High frequency in vivo ultrasound imaging was conducted at pre-dehydration, post-dehydration and rehydration to collect blood velocity waveforms. MRA was conducted pre-dehydration to quantify superior thyroid artery geometry. The study design also incorporated temporal controls (N= 3) and MRA controls (N=4).

Results: Systemic dehydration induced an average body weight loss of 10.5%. Rehydration resulted in average body weight regain of 10.9%. Statistically significant reductions ($p \leq 0.05$) were observed in maximum and average blood flow rate in the superior thyroid artery after dehydration. Rehydration reversed these changes to pre-dehydration levels. No significant differences were observed in vascular diameter after dehydration or rehydration.

Conclusion: Systemic dehydration decreased blood flow to the larynx. Rehydration restored blood flow. Change in hydration status did not change vascular geometry. These preliminary findings demonstrate the feasibility of using ultrasound and MRA imaging to quantify hemodynamic changes and visualize laryngeal vessels under varying physiologic conditions.

Inadvertent Superficial Injection of Hyaluronic Acid for Vocal Fold Augmentation--Does It Matter?

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Christopher D. Dwyer, MD; Joseph Chang, MD; Karla O'Dell, MD

Background/Objectives: Superficial injection of vocal fold injection augmentation material is avoided due to deleterious impact on mucosal wave. Anecdotally, patients who have had inadvertent superficial injection of hyaluronic acid have avoided unfavorable effects though this has not been previously reported. Thus, this study aims to evaluate the voice and stroboscopic outcomes of superficial injection of hyaluronic acid compared with matched controls.

Methods: All recorded cases of vocal fold injection augmentation at a single academic center from 2020 to 2022 were reviewed for a total of 192 injections. Three cases of inadvertent superficial injection of hyaluronic acid were identified. Matched controls were selected based on injection material, patient age, sex, and injection laterality. Video clips of injections and follow up videostroboscopy for cases and controls were randomized. Four fellowship-trained laryngologists, blinded to the research question and all methods, were asked to rate depth of injection augmentation as well as glottal closure and mucosal wave by the Voice-Vibratory Assessment of Laryngeal Imaging (VALI) scoring system.

Results: Follow up interval was three weeks in all cases and controls. Patients had an average decrease of 18.2 points on VHI-10 score at follow up, and there was no difference in scores between groups. Blinded raters unanimously identified the cases of inadvertent superficial injection. There was no difference in raters' scoring of stroboscopic parameters between superficial versus non-superficial injections.

Conclusions: While superficial injection of long-acting vocal fold injection augmentation materials should be avoided, this small cohort study suggests hyaluronic acid products may be more forgiving.

Inflammatory Reaction to Vocal Fold Injection Laryngoplasty with Hyaluronic Acid: Evaluation and Management

Dylan J. Cooper, BA; Seth E. Kaplan, MD

Objectives: Inflammatory reaction to vocal fold injection laryngoplasty with hyaluronic acid (HA) is a rare condition whose optimal management is not established. In this study, we aim to review the presentation of these reactions and outline an approach for evaluation and management.

Methods: We performed a retrospective review of patients who had vocal fold injection augmentation with HA between August 2018-August 2022. We then identified patients with post-injection inflammatory reaction and reviewed demographic data, indication for injection, amount of HA injected, setting of procedure, symptoms, and VHI-10 scores. The types of complication, management plan, and onset and resolution time were also recorded. A comprehensive literature search for similar complications was conducted for comparative analysis of management.

Results: We identified 81 patients (124 vocal folds) who underwent vocal fold injection laryngoplasty with HA over a 5-year period. Three patients (3.7%) had a post-operative inflammatory reaction (4.0% of all vocal folds). Of the 3, 2 presented with dyspnea and stridor, while 1 presented with dysphonia, with onset of symptoms ranging from 2h to 2 weeks following injection. All 3 patients were treated with oral corticosteroids in the outpatient setting. For comparison, 15 patients with inflammatory reactions to HA were treated with steroids, antibiotics, and observation alone, for which there was no statistical difference in resolution time ($P = 0.425$).

Conclusion: We suggest a management algorithm to help decrease laryngeal inflammation following HA injection. Familiarity with the treatment of this rare complication is essential for achieving optimal outcomes.

Influence of Age on Voice Quality after Transoral CO2 Laser Microsurgery

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Jerome Lechien, MD, PhD

Objective: To study the post-operative evolution of voice quality of patients treated by transoral CO2 laser microsurgery (TLM) according to the age.

Methods: Patients treated by type I to VI TLM and post-operative speech therapy were prospectively recruited from our hospital. The voice quality was assessed pre-, 1-, 3- 6- and 12-month posttreatment with voice handicap index (VHI), dysphonia, roughness, breathiness, asthenia, strain (GRBAS), maximal phonation time (MPT), F0, F0 standard deviation (STD), percent jitter, percent shimmer, noise-to-harmonic ratio (NHR), vocal fold vibration assessment and speech fluency. Evolution of voice outcomes was analyzed considering age of patients (<60 versus ≥60 years).

Results: Seventy-five patients completed the evaluations. Thirty-four and forty-one patients were <60 or ≥60 yo, respectively. Subjective and objective voice parameters (VHI, G,R,B), jitter and fluency significantly improved from 1- to 6-month post-TLM in <60 yo individuals. The voice parameters improved 12-month post-TLM in the ≥60 yo group at the exception of VHI that improved 3-month post-TLM. There were positive associations between age and 12-month NHR, G and A parameters. Preoperative VHI was a significant indicator of 12-month objective and subjective voice parameters (i.e. VHI, jitter, shimmer, NHR, G, B, S, and fluency).

Conclusion: The post-operative evolution of voice quality parameters may vary between patients according to the age. Preoperative VHI is predictive of 12-month subjective and objective voice outcomes.

Laryngeal Amyloidosis: Can It be Determined with Imaging?

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Jonathan Young, MD; Francoise Chagnon, MD; Karen Kost, MD

Objective: The objective of this study was to review the imaging of patients diagnosed with laryngeal amyloidosis, in order to determine if any specific findings suggest the presence of this disease.

Methods: A retrospective chart review of adult patients with confirmed histopathological diagnosis of laryngeal amyloidosis was performed, from January 2009 to September 2022. Clinico-demographic factors were collected. A fellowship-trained head and neck radiologist subsequently reviewed all computed tomography (CT) scans and magnetic resonance imaging (MR) findings within this cohort.

Results: 12 patients with histologically confirmed laryngeal amyloidosis were identified, with a total of 39 imaging studies analyzed. The most frequent location was combined glottic and supraglottic regions with involvement of the true and false vocal folds in seven patients. On CT, the most common finding was a submucosal soft tissue, homogenous and well-defined focal or diffuse mass with contrast enhancement. Punctate calcifications were only present in one case. Two patients showed multifocal disease. All cases with MR studies showed the same signal intensity, described as intermediate T1-weighted, low T2-weighted, with contrast enhancement. Diffusion weighted images (DWI) were obtained in every patient without evidence of diffusion restriction.

Conclusion: This case series is the largest to search for unifying imaging findings of laryngeal amyloidosis. This research suggests that MR features in laryngeal amyloidosis are uniform and more specific than CT. We therefore suggest MR as an adjunct imaging modality, to provide a more prompt and accurate diagnosis of laryngeal amyloidosis.

Laryngeal Chondroma-What Is Known?: Scoping Review

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Background: Cartilaginous tumors of the larynx are rare lesions, representing less than 1% of all laryngeal tumors. Chondromas are benign mesenchymal tumors that are characterized by their slow-paced growth. They most frequently develop in the cricoid cartilage, followed by the thyroid, the arytenoid, and the epiglottic cartilage. This scoping review aims to understand the extent and type of evidence concerning the epidemiology, clinical characteristics, morbidity, and recurrence of the laryngeal chondroma.

Methods: We identified observational studies in different databases. The scoping review was conducted from 1893 to 2022 to recognize those studies describing laryngeal chondromas.

Results: A total of 296 studies were identified, and 132 abstracts were evaluated. From these, 61 studies met the inclusion criteria. Of the 61 manuscripts, there were 44 case reports, 10 case series, and 7 cohorts. A total of 407 participants were analyzed, and 90 patients with laryngeal chondroma with a sex ratio of 2.5:1 male: female. The most frequent localization was the cricoid 38 (42.2%), followed by the thyroid cartilage 15 (15.5%) and the arytenoid cartilage 6 (7.1%). Most laryngeal chondromas presented with dyspnea (62.3%) and hoarseness (54.7%). The recurrence rate was 10%, and complications were rare after resection.

Conclusion: The most common morbidities were tracheostomy and voice disorders. This scoping review found a low-frequency rate over all the cartilaginous laryngeal tumors. Most patients were treated with resection with a low rate of malignancy conversion. This population has low attributable mortality, morbidity, and recurrence in the current literature.

Laryngeal Extramedullary Plasmacytoma

Garrett Ni, MD; Jessica Tang, MD; Ahmed Soliman, MD

Extramedullary plasmacytoma (EMP) is a rare form of plasma cell neoplasm that occurs outside of the bone marrow. Although it represents less than 1% of all head and neck tumors, 80% of EMPs occur within the head and neck region, with most of them found submucosally in the paranasal sinuses and nasal cavity. Laryngeal EMP is especially rare, accounting for only 0.2% of all laryngeal neoplasms. We present a case of a patient presenting with dysphagia, dysphonia, and cough found to have laryngeal EMP. The patient subsequently received radiotherapy alone with favorable outcome at one year follow up.

Laryngeal Manifestations of the Human Monkeypox Virus

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Background/Objectives: Human monkeypox (HMPX) is a zoonotic orthopox DNA virus previously endemic in Africa that has recently expanded into an unprecedented global outbreak. Cutaneous and gonadal symptoms of HMPX have been well described, as well as reports of oropharyngeal manifestations (pharyngitis, tonsillitis, tongue edema). We present a case of HMPX with previously undescribed laryngeal symptoms and associated clinical findings, including severe laryngeal edema and supraglottic mucosal lesions.

Methods: Case report

Results/Case Report: A 36-year-old male with a history of HIV on bicitgravir/emtricitabine/tenofovir alafenamide presented with HMPX. ENT was consulted for stridor, trismus, and voice changes. Computed tomography (CT) of the neck showed edema of the supraglottic structures and lymphadenopathy, but no neck abscess. Initial nasopharyngolaryngoscopy revealed an omega-shaped edematous epiglottis and severe bilateral arytenoid edema leading to significant hooding of the arytenoid and post-cricoid mucosa, thus limiting visualization of the vocal cords. Additionally, flat, white, speckled lesions were seen throughout the laryngeal mucosa. The patient was started on intravenous steroids, proton-pump inhibitors, antibiotics, as well as tecovirimat. He was transferred to the intensive care unit for airway monitoring. His symptoms resolved over 5 days, with resolution of his stridor and other throat symptoms. He subsequently left against medical advice.

Conclusion: HMPX is known to be associated with oropharyngeal symptoms. Laryngeal manifestations are previously undescribed and the associated severe supraglottic edema may lead to a difficult airway situation. Otolaryngologists should be aware of this possibility; laryngoscopy should be utilized and proper precautions made if there is any concern for airway compromise.

Laryngological Complaint Prevalence in Hypermobile Ehlers-Danlos or Hypermobility Spectrum Disorders

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Introduction: This study aimed to quantify the prevalence of voice, upper airway, and swallowing complaints within the population of patients presenting to the Mayo Clinic Jacksonville Ehlers-Danlos Syndrome (EDS) Clinic for assessment of hypermobility.

Methods: 363 patients from the EDS Clinic met inclusion criteria for this study by completing questionnaires related to voice, upper airway, and swallowing between July 7, 2020 and July 13, 2022. Demographic data, voice related questions and hypermobility diagnosis information were analyzed retrospectively. Of these patients 289 were diagnosed with hypermobile Ehlers-Danlos Syndrome (hEDS) or Hypermobility Spectrum Disorder (HSD) based on the 2017 International Classification, and the remaining 74 patients did not meet the diagnostic criteria for either diagnosis and served as controls.

Results: There were no statistically significant differences between the hEDS and HSD groups regarding VHI-10 scores, voice, upper airway, and swallow complaints. Patients in the combined hEDS and HSD group were found to have more inducible laryngeal obstruction (ILO) symptoms compared to controls ($p=0.031$). For hEDS/HSD patients combined, 22.5% reported hoarseness, 33.9% of this group reported symptoms of dysphagia, and 27.0% reported symptoms of ILO. There was an increased prevalence of voice, upper airway, and dysphagia symptoms in patients diagnosed with hEDS/HSD compared to previously-reported prevalence data in the general population.

Conclusion: A significant proportion of patients diagnosed with hypermobility due to hEDS and HSD were found to have voice, upper airway, and dysphagia symptoms. These rates are higher than previously reported prevalence data in the general population.

Left Vocal Fold Paralysis Caused by Pulmonary Artery Hypertension: A Case Series

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Objectives: To describe rare presentations of left vocal fold paralysis (LVFP) caused by pulmonary artery (PA) dilation.

Methods: Case series

Results: Three women in their 30s and 40s presented to the Otolaryngology clinic for new onset hoarseness. All three women underwent videostroboscopy and were diagnosed with left vocal fold paralysis. Computed tomography (CT) of the neck and chest with contrast was performed in each patient which revealed dilation of the PA and no other abnormalities along the left recurrent laryngeal nerve (RLN). In one patient the diagnosis of idiopathic pulmonary arterial hypertension (IPAH) was already known and in the other two patients this led to a new diagnosis of pulmonary arterial hypertension (PAH). One patient had a distant history of heart surgery as a child for hypertrophic cardiomyopathy but no history of hoarseness following that surgery. All patients underwent treatment for the PAH but no patient had documented recovery of vocal fold motion. One patient underwent injection augmentation with subsequent improvement in voice, one patient reported subjective improvement of her voice after treatment of the IPAH and the other decided to defer treatment for her voice.

Conclusion: LVFP caused by compression of the left RLN as it courses through the aortopulmonary window is a rare complication of pulmonary hypertension. It is important to recognize PAH as a potential cause of idiopathic UVFP and order appropriate chest imaging to facilitate early diagnosis and referral to cardiology.

Long-Term Impact of Sinonasal Surgery on Subjective Perception of Voice

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Background/Objective: Sinonasal surgeries including Functional Endoscopic Sinus Surgery (FESS) can improve symptoms in patients with chronic rhinosinusitis. Studies have also suggested these surgeries result in a short-term improvement in patients' voices - as identified by significant decrease in Voice Handicap Index (VHI). The objective of this study was to follow patients longitudinally and evaluate long-term impact on subjective voice function following sinonasal surgery.

Methods: Patients with sinonasal symptoms were recruited at a tertiary academic center between 05/2021 and 09/2022. Pre-operative Sino-Nasal Outcome Test (SNOT-22) and VHI scores were collected. Patients underwent either FESS and/or septoplasty with turbinate reduction. Patients' subjective voice and sinonasal symptoms were re-evaluated in intermediate- and long-term follow-up intervals.

Results: Twenty-three patients were recruited, of which 10 were lost to follow-up at various points in the study. The average pre-operative SNOT-22 score was 38.8, and average VHI was 17. In the intermediate follow-up visits (average 77 days), SNOT-22 scores improved significantly to 23.8 ($p=.036$). Average VHI improved to 12.7 ($p=0.27$). This trend continued in long-term follow-up (average 216 days) with SNOT-22 remaining low at 24.5 ($p=.039$) and average VHI of 7.8 ($p=.085$).

Conclusions: Surgeries including FESS are a valuable option for patients with sinonasal complaints, with significant improvement in SNOT-22 scores. Despite potential impact on voice function by altering resonant cavities and nasal airflow, there was no significant impact on patients' voice as measured by VHI. Future directions include objective evaluation and comparison of participants' voice recordings by Consensus Auditory-Perceptual Evaluation of Voice (CAPE-V), which is currently underway.

Longitudinal Parameters of Subglottic Stenosis following Serial Endoscopic Surgical Intervention

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Objectives/Hypothesis: To assess the longitudinal physical parameters of subglottic stenosis (SGS) following serial endoscopic surgical intervention.

Study Design: Retrospective chart review.

Methods: 43 patients undergoing two or more endoscopic SGS procedures between 2012 to 2022 were retrospectively analyzed. Stenosis parameters, obtained intraoperatively for comparison, include distance from the vocal process, and stenosis length. We used a Wilcoxon Signed Rank test to analyze longitudinal changes in the distance and length of stenosis.

Results: The mean age of our patients was 56.9 (Range of 37 – 87). The number of serial surgeries ranged from 2 to 5 endoscopic procedure. SGS etiologies include idiopathic ($n=35$), autoimmune ($n=5$), and traumatic/intubation related ($n=3$). The mean distance of the stenosis from the vocal process for the entire group from 1st to 2nd procedures (changed from 7.6 +/- 4.7 mm to 6.6 +/- 7.3mm, $p=.602$) and, between the 1st and 5th procedures (from 11.5 +/- 5.9mm to 7.2 +/- 6.5mm) ($p=.052$). The mean length of the stenosis in patients with 5 serial procedures changed (from 16.3 +/- 3.4mm to 19 +/- 3.6mm) ($p=.073$), and less significantly between the 1st and all other serial operations.

Conclusions: In a cohort of serially operated subglottic stenosis patients, no statistically significant longitudinal changes in stenosis distance from the vocal folds and total stenosis length or demonstrable across serial endoscopic procedures. Further stratification of this cohort by adjuvant medication, surgical frequency, and stenosis etiology are ongoing.

Management and Prognosis of Verrucous Lesions of the Larynx: A Case Series

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Background: Verrucous lesions of the larynx (VLL), unlike other diseases of this subsite, at times lack the clear clinical features differentiating benign from malignant disease. Recent population-based studies have contributed to a better understanding of the epidemiology and treatment of VLL, but there is a dearth of recent case series including details on the clinical course of such lesions. Here, we aim to describe the demographics and clinical course of patients with VLL.

Methods: We reviewed the clinical data and pathology records of all patients undergoing direct laryngoscopy at a tertiary referral center from the years of 2004 to 2021, to identify all patients with VLL. We collected information on the demographics, treatment, and outcomes for VLL.

Results: We identified a total of twenty-three patients with VLL based on their original histopathological read. There were ten patients with verrucous carcinoma, six with squamous cell carcinoma with verrucous features (SCC-V), three with verruca vulgaris and four with verrucous hyperplasia. VLL were more common in men in their seventh decade of life. Two patients, both with SCC-V, were treated with radiation therapy; most patients were successfully treated with endoscopic trans-oral laser. Of the patients with SCC-V, four patients required tracheostomy while one required total laryngectomy. There was no disease-specific mortality.

Conclusions: This series contributes to an understanding of the natural history of VLL, suggesting that VLL are more common in older males. SCC-V may carry significant risk for morbidities but VLL can often be effectively treated with surgery with a good survival prognosis.

Modulating Vocal Effort in the Era of Videoconferencing

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Introduction: Videoconferencing is now an integral part of communication. Elevated vocal dose while using this technology results in vocal effort, fatigue, and strain. It is established that the virtual environment increases vocal effort, loudness, and reduces voice quality. Studies have examined how microphone and listener distance impact vocal intensity. This study explores whether microphone type influences these factors. Differences between microphones would guide recommendations when aiming to reduce patients' vocal demands.

Methods: This is a prospective crossover study. Patients are characterized as dysphonic or normal, based on their Voice Handicap Index (VHI). Subjects underwent four tasks on a video-conference call. Tasks included reading the rainbow passage, sustaining /a/, and conversational speech. Each task is performed across four conditions in randomized order: over-the-ear headset, in-the-ear headphones, desk microphone, and laptop microphone. Vocal effort, sound pressure level, and cepstral peak prominence were compared between tasks.

Results: 29/50 subjects have been recruited thus far. Currently 75% are female, with an average age of 34. 13/29 (45%) participants are dysphonic and 9/29 (31%) of participants have previously received voice therapy. Of the dysphonic participants, the average VHI is 32. Across all 3 tasks in-the-ear headphones elicit lower vocal volume, of approximately 1 dB, which is meaningful on this logarithmic scale. The difference does not vary between dysphonic and normal speakers. Perceived vocal effort, rated on the OMNI effort scale, is highest for the over the ear condition.

Conclusion: Preliminary analysis suggests microphone type during video-communication influences vocal effort, loudness. Over the ear microphones resulted in reduced loudness.

Novel Use of Autologous Tensor Fascia Lata in Medialization Thyroplasty for Unilateral Vocal Cord Paralysis: A Case Series with Short- and Long-term Outcomes

Doreen Lam, BA; Natasha Mirza, MD; Robert Brody, MD

Objective: Medialization thyroplasty (MT) for unilateral vocal cord paralysis (VCP) is commonly performed with foreign implants that risk inflammation and extrusion. We present our experience using autologous tensor fascia lata (TFL) implants.

Design: Retrospective case series

Methods: Patients who underwent thyroplasty and TFL harvesting between April 2017 and September 2022 with at least one follow-up were included. Comorbidities, treatment history, complications, and subjective outcomes at follow-up were collected.

Results: 15 patients met selection criteria, including 12 women and three men (median age = 59 and 43 years). Median follow-up was 20 months (IQR = 2-29). Medical histories include cancer (seven thyroid cancers, two lymphoma, two breast cancers on long-term chemotherapy, one metastatic renal cell carcinoma) and lung transplant (2). Previous surgeries include one parathyroidectomy, eight thyroidectomies of which three experienced intraoperative recurrent laryngeal nerve transections, and two had existing VCP. Nine received external beam radiation (median time to MT = 21 months). Eight received one vocal cord injection. Risk factors included diabetes (3), immunosuppression (2) and anticoagulation (2). None were active smokers. There were no surgery-related readmissions within 30 days or long-term complications (extrusions, infections). Patients reported improved voice (13) and swallowing (7) at follow-up. One had difficulty projecting and received hyaluronic acid injection with improvement. 4 reported persistent dysphagia. One had pain for two weeks at the harvest site.

Conclusion: The novel approach of MT using autologous TFL is a safe and effective for unilateral VCP patients with history of external beam radiation or immunosuppression.

Outcomes of Reinforced Staple Closure (RSC) of Pharyngeal Defect after Total Laryngectomy (TL)

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Background/Objective: Pharyngocutaneous fistula (PCF) is a common complication after TL. The aim of this study was to determine if RSC reduced the risk of PCF after TL.

Methods: Data was collected on all patients undergoing RSC after TL. The incidence and severity of PCF and postsurgical complications was assessed. Swallowing, diet, and speech outcomes were assessed using a modified barium swallow (MBS) and the Performance Status Scale for Head and Neck Cancer Patients (PSS-HN) on a representative subset of patients (n=4).

Results: Fifty-five patients underwent TL during a 15-year period, 13 of which underwent RSC of the pharyngeal defect and were included in the study. The study population included 13 males with a mean age of 68 years. Primary tumors were located in the glottis (n=9) or supraglottis (n=4). Eleven of 13 patients had recurrent disease that was initially treated with radiation (n=10) or chemoradiation (n=1) therapy. Tracheoesophageal prosthesis was placed in all patients. Postoperative BA swallow failed to show PCF in all patients. PCF developed in two patients on postoperative day 28 and 38, which resolved with opening and packing of the wound. Additionally, two patients developed wound infections, and one developed a minor wound dehiscence. All patients recovered back to a normal diet. PSS-HN data (median diet score=95; median speech score=100) and MBS assessment showed excellent outcomes.

Conclusions: RSC of pharyngeal defect is an effective method for reducing the incidence and severity of PCF and optimizing function outcomes after TL in appropriately selected patients.

Pediatric Post-Surgical Dysphonia

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Nikita Kohli, MD

Introduction: Dysphonia is defined as altered vocal quality, including pitch, volume and effort, that impairs communication or affects quality of life. Post-surgical dysphonia (PSD) is an uncommon complication after some surgeries and is best characterized in adults. There is a paucity of data on PSD in children, and pediatric PSD has not been described in the literature using a large national database. We aim to characterize the patient demographics and surgical procedures that are associated with PSD in pediatric populations.

Methods: The American College of Surgeons National Surgical Quality Improvement Program (NSQIP) was queried for pediatric patients who received a post-operative ICD10 diagnosis of dysphonia (R49 and variants). Descriptive statistics were performed.

Results: We identified 218 pediatric patients with PSD. The mean age of the population was 7.48 ± 3.95 (mean \pm SD). Over half of the patients were male (52.8%) and white (50.9%). The greatest proportion of surgeries were performed by pediatric otolaryngologists (41.7%, n=91), followed by pediatric plastic surgeons (28.4%, n=62). 'Direct laryngoscopy with excision and/or stripping' (CPT 31541) was the procedure with the highest proportion of PSD (28%, n=61), followed by 'Lengthening of palate, and pharyngeal flap' (CPT 42226). When grouping CPT codes by family of procedure, palatoplasty/pharyngoplasty/flaps (69.3%, n=151) and laryngoscopy/bronchoscopy (29.8%, n=65) comprised virtually all procedures in the study population.

Conclusion: PSD in the pediatric population is uncommon and occurs mostly after reconstruction of the pharynx or palate. Further investigations are warranted to identify risk factors associated with PSD in these operations.

Perceptions and Understanding of Transgender Patient Care: A Survey of Practicing Laryngologists

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Objectives: Transgender identities face significant health disparities including deficiencies in physician education, knowledge, and comfort with transgender health care. As the prevalence of the transgender population increases more individuals may seek gender-affirming surgery. Herein, we present a survey study which presents data on 1) the current practice patterns, 2) the familiarity of, 3) the perception of, and 4) the future educational goals of transgender health care among laryngologists in the U.S.

Methods: A cross-sectional survey study of practicing laryngologists in the U.S.

Results: A total of 53 laryngologists participated in the study, of whom 50 (94.3%) are in academic medicine. 25 (47.2%) participants have one to ten transgender patients currently under their care, while 20 (30.3%) have more than ten. Only 11 (20.7%) of the participants had formal training. With respect to physician attitudes, there was a trend toward greater overall competence with transgender care based on the total number of transgender patients cared for during their careers ($p < 0.001$). Although 37 (70%) of participants felt competent caring for transgender patients, 38 (72%) want to learn more about transgender care, and 49 (93%) support incorporating transgender care into otolaryngology residency/fellowship curricula.

Conclusions: There is a need for an increased awareness of transgender healthcare issues to address disparities experienced by this diverse population. Many laryngologists report wanting to learn more about this progressing part of our field and support incorporating transgender care into training. We attempt to spotlight the degree by which practicing laryngologists are familiar, competent, and comfortable with transgender care.

Perioperative Antibiotic Use in Esophagoscope with or without Therapeutic Intervention, A Survey Based Study

Abdullah Alanazi, MD; Milan Amin, MD; Malak Hawsawi

Background: There is a little data evaluating antibiotic use in esophagoscope procedures. the goal of this study was to determine antibiotic use rate and factors that influence antibiotic use during esophagoscope.

Methods: An online-based survey was distributed to the laryngologists across the United States experience, and patient factors influencing antibiotic use.

Results: There were 42 respondents (24.13% response rate).100% were in academic institutions. 88.1% of Respondents were fellowship-trained laryngologists. Most surgeons (90.5%) don't give perioperative antibiotics during diagnostic esophagoscope. In general, no statistically significant association was found between the routine of prescribing preoperative antibiotics and being fellowship-trained in laryngology while a statistically significant association was found between the fellowship training and the decision made based on patients' comorbidities ($P < 0.05$), 70% of those with fellowship training do not prescribe perioperative antibiotics based on comorbidities. A significant difference was observed between having a fellowship in laryngology or not, and the frequency prescribing perioperative antibiotics (sometimes) in Esophagoscopy with Balloon Dilatation ($P < 0.005$).the decision to prescribe perioperative antibiotics based on the patient's comorbidities was significantly associated with the years after the fellowship was completed, $P < 0.05$, 40% of the surgeons who completed more than 20 years in fellowship they do prescribe perioperative antibiotics in comparison, only 6.7% don't give.

Conclusion: most of the surgeon do not prescribe antibiotic during esophagoscope but there was significant variation between fellowship training in laryngology or not and prescribing antibiotics on some occasions. Prospective randomized studies are necessary to establish evidence-based practice guidelines for perioperative antibiotic use during esophagoscope procedures.

Pitfalls and Promises of Patient Reported Outcomes Measures (PROMs): Office-based injections for Unilateral Vocal Fold Paralysis

Phillip Song, MD; Vishwanatha Rao; Gopikrishnan Rao, BS;
Elliana Devore, MD; Ramon Franco, MD; Matthew Naunheim, MD, MBA

Objective: To describe the impact of office-based vocal fold augmentation to treat unilateral vocal fold paralysis (UVFP) through patient-reported outcome measures (PROMs). Further, to characterize the usefulness, current limitations, and challenges associated with PROMs data extraction and suggest strategies to conduct more efficient PROMs studies in otolaryngology.

Method: Retrospective chart review extracted from electronic medical records and audits performed during PROMs program implementation from April 2019 to April 2021. ICD-10 for vocal fold paralysis (J38.01 and J38.02) and CPT codes for vocal fold injection (31571,31573, and 31574) were used for the initial query. Data filtration methodology was recorded, and a manual chart review was used to verify the accuracy and precision of report results.

Results: Out of 2169 patients who met initial ICD-10 and CPT criteria, seventy-nine patients with confirmed UVFP and PROMs were identified. The highest yield combinations of CPT and ICD-10 codes were 31574 and J38.01 respectively. Lack of PROM measures, inconsistent procedure volume, and ambiguous coding were all associated with data loss. Detailed analysis of single-augmentation patients showed significant improvement in EAT-10, DI, and VHI-10 scores at varying intervals.

Conclusions: Office-based vocal fold augmentation to treat UVFP resulted in measurable improvements in patient-reported outcomes, most notably swallowing function. Multiple challenges were identified while extracting PROMs data: only 3.7% of the patients identified in the initial query based on CPT/ICD10 codes met the criteria for assessment. Significant improvement and specificity in report generation are needed to generate intervention-specific PROMs impacts.

Postoperative Follow-Up Rates for Gender Affirming Laryngeal Surgery

Zara Srangi, BS; Mark S. Courey, MD; Vikram Vasan, BA

Objectives: Gender-affirming laryngeal surgeries are becoming more common. Due to actual and/or perceived barriers to care that affect transgender people, we examined the difference in postoperative follow-up rates between patients undergoing gender-affirming surgery and those undergoing surgery for non-neoplastic vocal fold lesions.

Methods: A retrospective chart review of patients undergoing laryngeal surgery for either gender affirmation or non-neoplastic vocal fold lesions between January 2017 and June 2022 was undertaken. For both groups, all postoperative visits were scheduled preoperatively at select time points. The percentage of actual visits from those scheduled was calculated. Patient-reported outcome measures (PROMs), including a Transwomen Voice Questionnaire (TWVQ) and/or a Voice Handicap Index (VHI-10), were performed preoperatively and postoperatively. Standard statistical tests were performed to compare the groups.

Results: 187 patients were included. 30 patients had undergone surgery for non-neoplastic vocal fold lesions. 157 had undergone gender-affirming laryngeal surgeries. The follow-up rate for patients undergoing gender-affirming surgeries was 71.8% and 58.1% for patients undergoing non-neoplastic vocal fold lesion surgeries ($p = .026$). The preoperative, postoperative, and change in TWVQ and VHI-10 did not correlate significantly with follow-up rates.

Conclusion: Despite potential barriers to care, postoperative transgender women's follow-up rate is significantly higher compared to cis-gendered patients undergoing elective laryngeal procedures for non-neoplastic vocal fold lesions. When comparing their follow-up rates with self-reported satisfaction measures, there was no significant correlation. Future multicentric studies are needed to evaluate the follow-up rates for other gender-affirming surgeries to address any disparities that may be uncovered.

Practical Application of Culture Directed Treatment for Bacterial Laryngitis

Keith Conti, MD; Erin Hunt, BS; Adelaide, BS;
Aaron Jaworek, MD

Background/Objectives: Situated at the center of the upper aerodigestive tract, the larynx often is susceptible to a variety of insults including infectious, mechanical, environmental, allergic, and other inflammatory/immune-mediated processes. When an inflammatory response is triggered within the larynx, laryngitis can occur. This can manifest as hoarseness and cough, among others. The purpose of this research is to better understand the clinical presentation and patient characteristics of chronic bacterial laryngitis as well as better characterize when culture directed therapy should be performed.

Methods: A single center, retrospective chart review was performed for patients who had laryngeal cultures obtained at a tertiary otolaryngology office from August 2015 through July 2022.

Results: Thirty adult subjects were identified [ages 38 – 87, 2/3 F] who had laryngeal cultures obtained in the office for suspected bacterial laryngitis. Nearly half had already been started on acid suppression therapy for presumed reflux laryngitis. The most common symptoms at presentation included hoarseness, cough, sore throat, and mucous/throat clearing. The most common pathogens isolated from laryngeal cultures were methicillin-sensitive staphylococcus aureus (MSSA) and methicillin-resistant staphylococcus aureus (MRSA). Most of the subjects experienced relief in their symptoms after the appropriate culture directed course of antibiotics.

Conclusions: The use of culture directed antibiotics for bacterial laryngitis can help to facilitate proper diagnosis and treatment. Many of these patients have underlying risk factors for bacterial laryngitis including immunosuppression, dry mouth/throat conditions. More research is needed to improve our understanding of this unique patient population and to determine optimal treatment and preventative strategies.

Prevalence of Voice Disorders in the United States

Molly Huston, MD; Matthew Naunheim, MD, MBA

Objective: In recent years, there have been many potential changes in voice use for the general population; universal masking, teleconferencing, and voice assistant technology have become more common. Though prior studies have investigated the prevalence of voice disorders, more recent data –potentially reflective of current vocal demand – has not yet been obtained. This study aims to update national prevalence data on dysphonia.

Methods: Nationally representative survey

Results: One thousand five-hundred and twenty-two responses were included. 50.2% of those surveyed indicated that they use teleconferencing programming technology and 53.6% use voice assistant technology. 12% of respondents endorsed having a current voice disorder, 21% indicated they had previously experienced dysphonia, and 9% of patients endorsed recurrent voice problems. When controlling for other factors, certain groups were more likely to report a voice disorder, including singers ($p<0.001$), teachers ($p<0.001$), those using voice assistants ($p<0.001$), and those using teleconferencing technology ($p<0.001$).

Conclusions: Despite the changes in the way the population may be using their voice, the prevalence of voice disorders remains relatively stable. Voice assistants and teleconferencing technologies, which require different patterns of voice use, are associated with voice disorders.

Profound Lingual Tonsillar Hypertrophy from a Rare Source

Andrew Vahabzadeh-Hagh, MD; Michael Tang, MD;
Amy Liu, BS; Leo Meller, BS*

Background/Objective: A 22-year-old female presents with several months of lymph node swelling, voice change, dysphagia, and shortness of breath when lying down. History of tonsillectomy in youth. Progressive symptoms over the ensuing months. Flexible laryngoscopy demonstrated profound lingual tonsil hypertrophy with distortion of laryngeal anatomy. Here we describe a unique case of obstructive lingual tonsil hypertrophy resulting from oral gonorrhea. This case highlights a rare manifestation of a rare but increasingly prevalent reportable disease in the United States.

Methods: CT neck with contrast demonstrated prominent lingual tonsillar tissues effacing the vallecular and exerting downward mass effect on the epiglottis. Pharyngeal swab was positive for *Neisseria gonorrhoeae*. Patient was treated with intramuscular ceftriaxone and clearance subsequently confirmed. Patient remained severely symptomatic from lingual tonsil hypertrophy and was therefore taken for lingual tonsillectomy.

Results: Intraoperative findings demonstrated remarkably enlarged lingual tonsils with hypertrophy extending up into the inferior tonsillar fossae. A hybrid transoral approach using first the Crowe-Davis retractor followed by a Lindholm laryngoscope allowed complete removal of the lingual tonsils from their superior to inferior extent. A deformed and malacic epiglottis remained requiring epiglottopexy. Pathology showed follicular hyperplasia, no carcinoma or evidence of lymphoproliferative disorder.

Conclusion: Lingual tonsil hypertrophy from oral gonorrhea is a rare and previously undescribed phenomenon. This case highlights the importance of keeping a broad differential for sexually active patients with tonsillitis as well as the unique management strategies deployed.

Prolaryn Interarytenoid Injection for Oropharyngeal Dysphagia in Children

Maria C. Carrasco, MS; Taylor Stack-Pyle, BS;
Carlton J. Zdanski, MD; Jason M. Roberts, MD

Objective: Prior reports of feeding-related disorders occurred in 25-45% of otherwise healthy pediatric patients and in up to 80% of pediatric patients with developmental disorders. Studies of pediatric patients having aspiration and type I laryngotracheal clefts have shown improvement after interarytenoid injection laryngoplasty. This report describes the outcomes of using prolaryn interarytenoid injection in patients having aspiration and/or penetration and in patients with no abnormal anatomical findings.

Methods: A single-site, retrospective chart review of children under the age of 5 with aspiration events and/or penetration treated with prolaryn interarytenoid injections. Modified barium swallow studies were used to evaluate aspiration or penetration.

Results: Of the 50 patients meeting the study criteria, 39 had sufficient follow-up data to review. From these, 29 patients (74.4%) demonstrated at least partial symptom improvement and 10 demonstrated no improvement.

Conclusions: Pediatric feeding problems can be exacerbated by anatomic anomalies such as laryngeal clefts and interarytenoid notches. Aspiration and penetration events in children with and without abnormal anatomy can be improved using interarytenoid injection laryngoplasty.

Prolonged Effects of Hyaluronate Injection in Adolescent Unilateral Vocal Fold Paralysis

Tuan-Fen Fang, MD; Yu-Cheng Pei MD

Objective: Adolescents who have suffered from unilateral vocal fold paralysis (UVFP) before puberty may have a long-lasting hoarseness even after growing-up. When and how to manage such hoarseness remains inconclusive. This project aims to evaluate the safety and effectiveness of a single session hyaluronate injection in UVFP that had occurred before puberty.

Materials and methods: Patients diagnosed of UVFP after hyaluronate injection were identified from our database between Jan 1, 2015 and Dec 31, 2020. Those patients who suffered from UVFP-related hoarseness before 18 years old were reviewed. Voice therapy is recommended before the injection trial. The subjective immediate effects were determined by patients reports at one month. Meanwhile, the video stroboscope and perceptual voice analysis were performed by an ENT doctor and a speech language pathologist. The voice performance was then recorded every 6 months till the patients accepted another intervention.

Results: Twelve patients (7 males and 5 females) with presenting age at 16.5 ± 2.5 years old were recruited. The UVFP symptoms had occurred since 6.6 ± 7.6 years old. After hyaluronate injection, 9 (75%) patients were satisfied with their voice quality at the 1-month follow-up evaluation. At the median follow-up of 24.1 months, only 1 of 9 received permanent laryngoplasty while the voice outcomes were consistent in the others after a single session hyaluronate injection.

Conclusions: Single session hyaluronate injection laryngoplasty can be a first-line treatment for adolescents' UVFP that had happened before puberty. Some of the patients may get prolonged beneficial effects.

Readability and Quality Assessment of Patient Education Materials from the American Laryngological Association

Daniel Gorelik, BS; Karen W. Asi, MD; Yin Yiu, MD

Objective: Most patients obtain health information related to their clinical evaluation by searching for online patient education materials (PEMs). The purpose of this study is to review the patient education section of the American Laryngological Association (ALA) website for readability and quality to determine potential targets for improvement.

Methods: All available PEMs found on the ALA website were reviewed. Materials were evaluated for readability using the Flesch Reading Ease (FRE), Flesch-Kincaid Grade Level (FKGL), Simple Measure of Gobbledygook (SMOG), and Coleman-Liau Index (CLI) assessments. FRE scores are reported from 0-100, with 100 identifying material that is very easy to read. FKGL, SMOG, and CLI estimate the United States grade level required to read materials. Quality assessment was performed using the Patient Education Materials Assessment (PEMAT), scored out of 100 maximum points. The DISCERN instrument was utilized specifically to evaluate quality of materials discussing treatment options.

Results: 37 unique PEM articles were identified. Mean FRE was 41.5 (SD=12.3), indicating very difficult to read material. FKGL, SMOG, and CLI mean scores were 12.2 ± 2.3 , 14.7 ± 2.4 and 13.1 ± 2.3 , respectively, indicating a high reading level necessary to understand the materials. Average PEMAT understandability was 53.8 ± 9.8 . Average DISCERN score was 37.2 ± 5.6 , indicating very poor quality.

Conclusion: Current patient education materials from the ALA are written above a recommended 6th-8th grade reading level and vary in their quality and understandability. Key areas of improvement are detailed based on common themes noted throughout review of the material.

Reinke's Edema in Office Versus Operating Room Management: Systematic Review and Meta-Analysis

Abdullah Alanazi, MD; Albert L. Merati, MD; J P Gilberto, MD;
Tzu-Cheng Kao

Objective: Reinke's edema is a benign laryngeal disorder, caused most commonly by chronic smoking. Many studies evaluated the outcome of in-office interventions to treat Reinke's edema. The goal of this study was to examine the available literature on Reinke's edema management and to conduct a meta-analysis comparing the in-office to in-operating room (OR) interventions.

Method: Literature search was performed in six databases using preferred reporting items for systematic reviews and meta analyses (PRISMA) guidelines. Outcomes are voice handicap index (VHI10) and GRBAS score.

Result: Among 1258 articles searched, six articles were considered for meta-analysis. By using a linear mixed model, there was no significant difference in the mean of GRBAS score between in-office and OR interventions, $p=0.1709$. Interestingly, by adjusting other variables such as sex and gender, there was a significant difference between OR and in-office interventions (estimated difference = 3.1020, with 95% confidence interval (CI) [0.5307, 5.6734], $p=0.0205$, which in operating room interventions showed better results. By using the same model, Linear mixed model, there was no significant difference in the mean of VHI10 score between OR and in-office interventions (estimated difference = -2.0909, with 95% confidence interval (CI) [-13.6565, 9.4747], $p=0.7024$).

Conclusion: this study showed significant difference between OR and in-office interventions on the mean GRBAS score by adjusting other variable such as age and sex, while comparing the mean VHI score between in-office and OR interventions did not show any significant difference. Prospective randomized studies are necessary to establish the voice

Return of Aspiration-Free Swallow After Laryngotracheal Anesthesia

Malia S. Gresham, MD; Patrick McGarey Jr., MD; Matthew R. Hoffmann, MD, PhD;
Gregory R. Dion, MD; Hunter Skoog, MD; Natalie Derise, MD; Jessica Bishop, MD;
Beau Vandiver, MD; Manish Shaha, MD; Edie R. Hapner, PhD, CCC-SLP; C. Blake Simpson, MD

Introduction: Anesthetization of the upper airway is a critical component of office-based laryngeal procedures. Prior studies have demonstrated swallow impairment and aspiration immediately following laryngotracheal anesthesia (LTA). At what time a safe swallow returns after LTA is uncertain, and recommendations provided to patients vary across providers. No study has rigorously characterized the time required for return of aspiration-free swallow after LTA.

Methods: We conducted a prospective study performing fiberoptic endoscopic evaluation of swallow (FEES) at time points of interest after administration of LTA (6 cc of 4% topical lidocaine to endolarynx) for office-based tracheobronchoscopy. Patients without history of dysphagia were included. Time points evaluated were 90, 66, and 46 minutes after LTA. 10 participants were enrolled per time point. Enrollment occurred sequentially, and if two participants in a given group aspirated, the study would be concluded. Five, 5cc water swallows (dyed green) were performed.

Results: 30 participants have been recruited. One participant in the 90-minute group and 1 patient in the 66-minute group (10%) demonstrated asymptomatic aspiration on one of five swallows. Zero of ten participants in the 46-minute group aspirated.

Conclusions: This is the first prospective study evaluating return of aspiration-free thin liquid swallow at multiple time points after LTA. This study provides experimental evidence that safe swallow may return earlier than previously thought. Data collection is ongoing. Results can be considered when providing guidance to patients on when to resume oral intake after office-based laryngeal procedures.

Safety and Adverse Events of Medialization Thyroplasty in Patients with Unilateral Vocal Fold Paralysis: A Systematic Review

Zachary A. Valley, BS; Avrohom Karp, BS;
David Garber, MD

Introduction: Unilateral vocal fold paralysis (UVFP) can result in various voice, breathing, and swallowing issues. Type I medialization thyroplasty (MT) is a procedure that has become the mainstay surgical treatment for UVFP. The procedure is widely considered safe. This systematic review identifies the safety and adverse events associated with MT throughout the literature.

Methods: The PubMed database was queried with the keywords “(thyroplasty complications) OR (medialization laryngoplasty complications)”. Articles were selected if published between 2000-2022. Abstracts were screened and data were extracted from included studies. Only Type I MT procedures were included; case reports and patients who underwent MT with arytenoid adduction were excluded. Participant characteristics, intervention details, results, and adverse events were extracted.

Results: The initial PubMed query identified 520 relevant abstracts, of which 38 studies met eligibility criteria and were included. A total of 2,277 patients underwent MT. The most common implant was silastic (n=906, 39.8%) followed by Gore-Tex (n=811, 29.6%). There were 256 (11.2%) total complications reported; 109 (4.8%) were major. The most common complication was nonobstructive hematoma (n=60, 2.6%) followed by hemorrhage (n=35, 1.5%) and airway obstruction (n=17, 0.75%). Implant extrusion (n=18, 0.79%) or displacement (n=15, 0.65%) occurred mostly in silastic and Gore-Tex implants and required revision surgery in some patients. Several studies revealed that outpatient MT is safe with same-day discharge.

Conclusions: UVFP treated by MT has a low rate of complications. MT performed as an outpatient procedure has been shown to be safe.

Safety and Efficacy of Formalized Tracheostomy Techniques: A Systematic Review and Meta-Analysis

David Strum, MD; Nupur Bhatt, MD; Arman Saeedi, BS, MPH;
Ghayoor Mir, Do; Michael Chow, MD; Adam Jacobson, MD

Background/Objectives: There is debate regarding the preferred technique for tracheotomy incision. Bjork flap is an example of a formalized tracheostomy that was first described following tracheostomy tube dislodgement resulting in fatality. However, some evidence suggests that formalized tracheostomies increase risk of long-term complications including tracheocutaneous fistula, tracheal stenosis, and dysphagia. We aim to systematically review short and long-term outcomes from different open tracheostomy techniques.

Methods: A systematic review of the literature was performed in accordance with PRISMA guidelines. Studies comparing outcomes from different open tracheostomy techniques were included. Meta-analysis of study parameters was performed.

Results: 896 studies were identified using search criteria. Among these, 8 studies were included. A total of 1779 patients underwent open tracheotomy with formalization. Short-term reported complications included stomal bleeding in 51 patients (3.0%), stomal infections in 27 patients (1.8%), and tracheostomy tube extrusion in 3 patients (0.60%). Long-term complications included subglottic/tracheal stenosis in 12 patients (0.80%) and tracheocutaneous fistula in 48 patients (3.4%).

A total of 205 patients underwent conventional tracheostomy. Three patients (3%) had reported complications of bleeding and infection. There were no reported tube extrusions. Subglottic/tracheal stenosis occurred in 9 patients (6.4%).

Conclusions: The rates of bleeding, infection, and tube extrusion with formalized tracheostomies are comparable to those reported in the literature for conventional tracheostomy. Patients additionally had decreased rates of subglottic/tracheal stenosis. Tracheostomy formalization is a safe and effective technique with a low overall complication rate and should be considered in patients at risk of decannulation or those who require prolonged tracheostomy.

Safety and Efficacy of Long-Term Onabotulinumtoxin A Use for Laryngeal and Oromandibular Dystonia

Diana N. Kirke, MBBS, MPhil; Janice Pagoda, PhD;
Mitchell F. Brin, MD; Andrew Blitzer, MD, DDS

Introduction: Botulinum toxin (BoNT) has been used for over thirty years as a treatment for both laryngeal (LD) and oromandibular dystonia (OMD); little is known regarding the safety and efficacy of its long-term use. This retrospective review aimed to assess this using prospectively-collected patient data over the course of three decades.

Materials and Methods: Retrospective analysis was undertaken from longitudinal data abstracted from patient charts, which included injections of onabotulinumtoxinA (BOTOX, onabotA) for the treatment of LD or OMD performed separately by the two senior authors (MB and AB). The analysis examined basic demographics, dosage stability over time, efficacy as measured by the percent normal function (PNF) rating scale, and safety assessed as incidence of adverse events (AEs).

Results: There were a total of 606 patients identified (187M:396F, 23 not reported) with mean (standard deviation) age 50 (14) years. There were 560 patients with LD and 57 patients with OMD, (noting that 11 patients had both diagnoses). Of those with LD, 494 had adductor laryngeal dysphonia (ADLD) and 66 had abductor laryngeal dysphonia (ABLD). Of those with OMD, 33 were closing type and 24 were of the opening type. There was general stability of onabotA dose over time in both LD and OMD. The most common adverse events reported being those that were consistent with local weakening of injected muscles.

Conclusion: This analysis supports the safety and efficacy of long term onabotA use for the treatment of both LD and OMD. It also provides evidence of the stability in dosing over a long time.

Scoping Review of Surgical Rehabilitation of Post Intubation Phonatory Insufficiency (PIPI) AKA Surgical Rehabilitation of Posterior Commissure Insufficiency

Ellen L. Ferraro, MD; Paul Bryson, MD, MBA;
Robert Lorenz, MD; Michael S. Benninger, MD;
Rebecca Nelson, MD; William Tierney, MD

Introduction: Post intubation phonatory insufficiency (PIPI) describes posterior glottic insufficiency (PGI) caused by prolonged intubation leading to medial arytenoid ulceration, mucosal scarring and incomplete cricoarytenoid joint adduction. There are limited studies on PIPI and an ideal treatment ladder remains elusive. The purpose of this review is to showcase current techniques and gaps in our treatment algorithm of PIPI.

Methods: Two independent reviewers completed a systematic search of the literature studying PIPI. Reported intubation history, laryngeal defect, clinical symptoms, surgical intervention, and outcomes were gathered from included studies.

Results: Nine studies met our inclusion criteria for full review, (45 patients) all of which were case reports/series. All patients had posterior glottic defects, most commonly loss of medial arytenoid tissue, causing varying degrees of PGI. Eleven patients had vocal fold (VF) immobility or hypomobility. Treatment interventions were observation (1), speech therapy alone (2), VF or posterior glottic augmentation with injection (15), medialization laryngoplasty (4), arytenoid repositioning (6), endoscopic (19) or open (3) cricoid reduction, local mucosal rotation flap (11), or free mucosal graft (2) to fill the glottic defect. Observation, voice therapy, and augmentation or type 1 laryngoplasty failed to improve symptoms. Other surgical techniques improved symptoms with varying outcomes.

Conclusion: PIPI is a difficult injury to diagnosis and treat. Conservative measures and augmentation/laryngoplasty fail to fix the PGI. Our review supports symptom improvement with reconstruction of the posterior glottic defect with cricoid reduction or mucosal grafts. Future investigation is needed to better define the diagnosis and a successful treatment algorithm.

Single-Use Endoscopy for the Evaluation of Swallowing (FEES)

Christina Cool, MPH; Ben Brody, BA; Jason Cronwall, MBA;
Christian Escobar, BS; Jacqueline Mojica, MS, CCC-SLP

Introduction: Botulinum toxin (BoNT) has been used for over thirty years as a treatment for both laryngeal (LD) and oromandibular dystonia (OMD); little is known regarding the safety and efficacy of its long-term use. This retrospective review aimed to assess this using prospectively-collected patient data over the course of three decades.

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Conclusion: This analysis supports the safety and efficacy of long term onabotA use for the treatment of both LD and OMD. It also provides evidence of the stability in dosing over a long time.

Subligamental Cordectomy for Laryngeal Granular Cell Tumor in a Pediatric Patient

Jillian L. Haywood, MS; Nicholas Toomey, MD
Alexander P. Marston, MD

Introduction: Laryngeal granular cell tumors (GCT) are rare lesions, particularly in pediatric patients. Limited data is available on their characteristic features and efficacy of their management. We present a case of GCT of the right true vocal cord in a 12-year-old male treated initially with gross resection of the lesion and later with subligamental cordectomy for excision of residual tumor.

Methods: The electronic medical record was utilized to review the patient's clinical and surgical history.

Results: A 12-year-old male presented with a 2-year history of worsening dysphonia and cough. Flexible laryngoscopy revealed a submucosal pedunculated mass of the right mid and anterior true vocal cord. Gross resection via direct laryngoscopy was performed. Final pathology confirmed a benign GCT; however, a positive margin was identified. Subsequently, a right subligamental cordectomy was pursued for complete excision of the residual GCT. Intraoperative findings included submucosal tumor extension along the length of the true vocal cord with infraglottic extension. In order to achieve negative margins, the resection was carried through the vocal ligament down to the level of the vocalis muscle. The patient achieved an excellent voice outcome without evidence of recurrent tumor at 2 years of follow-up.

Conclusions: This case demonstrates that subligamental cordectomy can be an effective treatment method for laryngeal GCT in pediatric patients when prior management has failed with a potentially excellent voice outcome. This case also provides valuable data regarding pediatric GCT location and propensity for submucosal tumor spread.

Surgical Management of Subglottic Stenosis During Pregnancy: A Systematic Review.

Katherine M. Miller, MD; Kevin Y. Liang, MD; Neil Nero, MLIS, AHIP;
Michael S. Benninger, MD; Rebecca C. Nelson, MD;
William S. Tierney, MD; Robert R. Lorenz, MD; Paul C. Bryson, MD, MBA

Objective: There are several options for surgical management of subglottic stenosis, including endoscopic and open procedures. However, treatment algorithms, outcomes, and anesthetic management of subglottic stenosis during pregnancy are not well described.

Methods: A systematic review of management of subglottic stenosis during pregnancy using the MEDLINE, EMBASE, and the Cochrane databases was performed, and then reported in compliance with PRISMA guidelines. Inclusion criteria consisted of those with subglottic or tracheal stenosis aged greater than 18 years, those in whom management was performed during pregnancy, and those who reported delivery related outcomes.

Results: After systematic review and detailed search of 330 identified articles, 18 articles met inclusion criteria and were included in the final analysis. All studies were case reports or case series (level 4 evidence). The median age was 29 and the median gestational age at intervention was 28 weeks. Left lateral positioning and fetal heart rate monitoring was used in nearly every case. The most common intervention performed was endoscopic balloon dilation. The patients were preoperatively managed with oral sodium citrate followed by propofol, midazolam, and fentanyl. In many cases, THRIVE or jet ventilation was satisfactory for maintenance of the airway. There was no fetal death or complications reported in these studies, and all but one woman proceeded to deliver at term.

Conclusions: Endoscopic balloon dilation during pregnancy is safe and effective, resulting in optimized respiratory outcomes for the mother as well as safe delivery of the fetus. The third trimester appears to be safe for airway intervention.

Technical Challenges for Laryngeal Electromyography (LEMG)

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Elysia Grose, MD; Rosane Nisenbaum, PhD; Clark A. Rosen, MD;
Michael C. Munin, MD; Libby J. Smith, DO

Background/Objective: LEMG is a useful diagnostic test in the evaluation of vocal fold paralysis (VFP). This study investigates factors that can make LEMG challenging to perform.

Methods: Patients with subacute unilateral VFP presented for LEMG were prospectively enrolled. Demographic data including BMI, previous neck surgery, and anatomic factors were collected. Patient-reported pain related to the procedure was recorded on a visual analogue scale (VAS). Electromyographer and otolaryngologist recorded a consensus rating of the perceived difficulty in performing the test.

Results: 111 patients (56.8% female) were enrolled between Aug 2015 and Aug 2018. Mean age was 55 ± 14 years and average body mass index (BMI) was 28.5 ± 6.4 . Mean VAS score was 3.5 ± 2.4 . 41.0% of the tests were considered “very easy” and 40.0% were considered “mildly challenging” by the clinicians. 15.7% and 2.8% were considered “moderately challenging” and “extremely challenging”, respectively. Of all patients, most common factors making LEMG difficult to perform include patient intolerance (15.6%) and difficult surface anatomy (50.5%). Surprisingly, elevated BMI is associated with a lower VAS score (Spearman Correlation Coefficient=-0.20, $p=0.04$). Bivariate analyses showed that prior neck surgery is associated with elevated VAS ($p=0.02$) but clinician perceived difficulty of performing the test is not associated with elevated VAS scores ($p=0.55$).

Conclusions: Majority of the LEMG tests are well tolerated by patients. Patient intolerance and difficult surface anatomy make LEMG challenging to perform, which affects clinician confidence in the test results, but does not increase pain in patients undergoing the test.

The Application of Superior Laryngeal Nerve Block for Non-Cough Laryngeal Complaints

Brooke Quinton, BS; Michael S. Benninger, MD; William S. Tierney, MD;
Victoria L. Gau, MD; Rebecca C. Nelson, MD; Candace M. Hrelec, MD; Paul Bryson, MD, MBA

Introduction: The use of superior laryngeal nerve blocks with corticosteroid and local anesthetic has emerged as a novel therapy for patients with refractory chronic cough. Laryngologists at our institution have begun investigating the effect of this procedure in patients with other complaints involving the larynx who have failed conventional medical therapy. This case series of 46 patients explores the effect of SLN block on non-cough complaints.

Methods: Retrospective chart review of 46 patients with who underwent SLN block for non-cough indications between July 2019 and March 2022 was performed. Demographics, comorbidities, and patient-reported outcomes were collected. The primary diagnoses for this group included: odynophagia, throat pain, cervicalgia, muscle tension dysphonia, laryngeal dystonia, globus sensation, hyoid bone syndrome, and Eagle syndrome.

Results: The cohort underwent an average of 1.24 bilateral injections (range 0-7), and 0.87 unilateral injections (range 0-4). 35 of 46 of patients reported an average of 51.0% improvement in their symptoms, with the treatment effect lasting 7.60 weeks on average. On subgroup analysis, the patients with spasmodic dysphonia, odynophagia, and hyoid bone syndrome had the best percent improvement on average (75-77.5%). Patients with globus sensation had the lowest percent improvement on average in response to this therapy, reporting only about 25%. 5 patients experienced a mild adverse reaction immediately following injection which resolved spontaneously.

Conclusion: The use of in-office SLN block for non-cough disorders involving the larynx requires further study with larger sample sizes to help delineate the efficacy of these applications.

The Effect of Noise on Deep Learning for Classification of Pathological Voice

Koki Hasebe, MD; Shintaro Fujimura, MD, PhD;
Tsuyoshi Kojima, MD, PhD; Koichi Omori, MD, PhD

Background: With the development of technologies related to deep learning, it has been shown that deep neural networks are useful in classifying the severity of speech disorders based on auditory impression ratings (GRBAS scale). However, there are several problems in actual clinical applications, one of which is environmental noise. In the research stage, speech recorded in an ideal environment with little noise is used for learning, and it is considered that the effect of noise may occur in actual applications, but there have been no studies examining the effect of noise in deep learning of speech yet.

Objectives: The objective of this research is to confirm the effect of noise in deep learning of voice evaluation, to construct a model that is less susceptible to noise, and to apply this model to actual devices.

Methods: The model was constructed and trained using deep neural networks to estimate the GRBAS scale, using a sample of more than 1,400 sustained vowel "a" from patients with speech disorders. The effect of noise in estimating the GRBAS scale was examined, and we verified whether adding noise to the training data in advance improves the learning accuracy.

Results: The addition of noise reduced the accuracy of the estimation, but how the accuracy was reduced was characteristic. This report also discusses noise tolerance methods and their application to actual equipment.

Conclusion: Though deep neural networks for evaluating voice are susceptible to noise, it is possible to reduce the impact and apply it to actual clinical practice.

The Impact of Digital Inequities on Laryngeal Cancer Disparities in the US

Evan Edwards, MME; David Fei-Zhang, BA; Daniel Chelius, MD;
Anthony Sheyn, MD; Jeffrey Rastatter, MD, MS

Background/Objectives: In the modern era, the use of technology can substantially impact care access but has been seldomly investigated in laryngeal cancer (LC) patients. We strove to develop and implement the Digital Inequity Index (DII), a comprehensive tool that quantifiably measures modern-technology access in the US, in order to assess digital inequity impact on LC care nationwide.

Methods: 22,850 patients from 2008-2017 in SEER were assessed for regression trends in long-term follow-up period, survival, prognosis, and treatment across increasing overall digital inequity, as measured by the DII. DII was calculated based on 17 census-tract level variables derived from the American Community Survey and Federal Communications Commission. Variables were categorized as infrastructure-access (i.e., electronic device ownership, type of broadband, internet provider availability, income-broadband subscription ratio) or sociodemographic (i.e., education, income, disability status), ranked, and then averaged into a composite score.

Results: With increasing overall digital inequity, length of long-term follow-up ($p < 0.001$) and survival ($p = 0.025$) significantly decreased. Electronic device access followed by internet-service availability were the most significant contributors to this detriment. Compared to LC patients with low digital-inequity, high digital-inequity was associated with increased odds of advanced preliminary staging (OR 1.06, 95% CI 1.03-1.08), treatment with chemotherapy (OR 1.06, 95% CI 1.04-1.08), and radiation therapy (OR 1.02, 95% CI 1.00-1.04), as well as decreased odds of surgical resection (OR 0.96, 95% CI 0.94-97).

Conclusions: Digital inequities contribute to detrimental trends in LC patient care in the US, allowing discourse for targeted means of alleviating disparities while contextualizing national sociodemographic trends of the impact of online access on informed care.

The Impact of Foreign Language Accent on Expert Listeners' Auditory-Perceptual Evaluations

Katherine L. Marks, PhD; Kimberly Dahl, MS;
Cara E. Stepp, PhD

Introduction: Auditory-perceptual evaluations of dysphonia, though essential for comprehensive voice evaluation, are subject to listener bias. For example, knowledge of an underlying voice disorder can influence auditory-perceptual ratings. Accented speech results in increased listener effort and delays in word identification. Yet, little is known about the impact of foreign language accents on auditory-perceptual ratings for dysphonic speakers. Recently Procter & Joshi (2022) found no impact of foreign language accents on students' auditory-perceptual ratings of non-disordered accented speech [4]. The purpose of this work was to determine the impact of a foreign language accent on experts' auditory-perceptual ratings of dysphonic speakers.

Methods: Twelve experienced voice clinicians rated two groups of speakers with muscle tension dysphonia (29 speakers with and 29 speakers without South American accents) using the Consensus Auditory-Perceptual Evaluation of Voice (CAPE-V). Speaker groups were matched based on sex, age, and mean smoothed cepstral peak prominence. Four linear mixed-effects models assessed the impact of a foreign language accent on expert auditory-perceptual ratings.

Results: The twelve raters demonstrated good inter- and intra-rater reliability ($ICC[3, k] = .79$; mean $ICC = .89$). The linear mixed effects models revealed no significant impact of foreign language accent on ratings of overall severity of dysphonia, roughness, breathiness, or strain.

Conclusion: Despite the possibility of increased listener effort and bias, foreign language accent had no effect on expert listeners' auditory-perceptual evaluations for dysphonic speakers. Findings support the use of auditory-perceptual evaluations for voice disorders across sociolinguistically diverse populations.

The Impact of Patient Factors on Attendance at Remote Telehealth Voice Therapy

Audrey Tran, BA; Rohith Kariveda, BA;
Preetha Velu, BA; Lauren Tracy, MD

Objectives: Voice therapy is effective treatment for dysphonia, but several factors pose barriers to attendance. Previous work evaluating voice therapy attendance has focused on in-person encounters, and identified public health insurance and travel distance as negative influences. This study investigates remote telehealth voice therapy and potential patient factors impacting attendance at an urban, safety-net hospital.

Methods: Retrospective review of adult patients referred for telehealth voice therapy between April 2020-November 2021 was conducted. Patient demographics including referral diagnosis and interpreter use were obtained from medical records. Home zip code served as proxy for socioeconomic status. Multivariate analysis examined relationships between patient factors and therapy attendance. Chi-square compared telehealth attendance rates with historical in-person attendance rates.

Results: Of 423 patients referred for telehealth voice therapy, 220 (52%) attended more than one therapy session, 98 (23%) attended one, and 105 (25%) never attended therapy. In contrast, 203/422 (48%) patients previously referred for in-person voice therapy never attended ($p < 0.001$). Multivariate analysis found no significant correlation between telehealth attendance and patient factors including race, interpreter use, insurance status, and socioeconomic status, including when adjusted for ethnicity and primary language.

Conclusions: A larger majority of patients attended telehealth voice therapy in comparison to in-person therapy. In contrast to previous studies evaluating in-person voice therapy, telehealth attendance was not negatively impacted by public health insurance. Other factors including race and socioeconomic status did not impact telehealth therapy attendance. As healthcare transitions back to in-person care, telehealth therapy should be considered to minimize potential barriers to care.

The Laryngeal Auditory Startle Reflex (LASR)

Catherine Sinclair, BSC (BIOMED), MBBS (HONS);
Maria J. Tellez, MD; Sedat Ulkatan, MD

Introduction: The human startle reflex is a generalized flexion response elicited by an unexpected, auditory, somatosensory, vestibular, or visual stimulus. The reflex varies depending on subject alertness and posture and, in adults, habituates to repetitive stimuli via supraspinal modulation. We present the first report of laryngeal component in the human auditory startle reflex, termed the laryngeal auditory startle reflex (LASR).

Methodology: Case series of 7 subjects. Intralaryngeal hookwire electrodes were inserted in laryngeal adductor musculature to collect electromyographic (EMG) data. Surface EMG data were collected from masseter, mentalis, orbicularis oculi, sternomastoid, strap musculature, and abductor pollicis brevis. A 120dB auditory stimulus was time-locked with EMG recording equipment (NIM Eclipse). Distraction techniques were employed to lessen the subject's anticipation.

Results: Mean age of participants was 41 years. Activation of laryngeal adductor muscles was obtained in all subjects. Mean response latency for laryngeal EMG was 56 milliseconds compared to 61 milliseconds for sternocleidomastoid. Response amplitude and duration were variable for all recorded muscle groups. All subjects displayed LASR habituation to subsequent stimulations over time. Distraction techniques enhanced the startle reflex in all muscle groups. One subject displayed distinct early and late laryngeal components, with the late response occurring at 97 milliseconds.

Conclusion: The human larynx exhibits an adductor startle reflex to auditory stimuli. As distinct from the laryngeal adductor reflex(LAR), the LASR has a longer onset latency and, in adults, displays habituation to repetitive stimuli. The LASR could have significant pathophysiologic implications, particularly in neonates, who may display lesser or no habituation.

The Use of Deep Learning Software in the Diagnosis of Vocal Disorders: A Systematic Review

Joshua Barlow, BA; Zara Sragi, BS; Gabriel Antonio Rivera-Rivera, MD, MPH;
Diana Kirke, MBBS, MPhil

Introduction: Widespread use of deep learning for analysis of voice and laryngoscopy images has the potential to expedite diagnosis of vocal disorders. This review intends to evaluate the current use of this technology and its ability to act synergistically with experienced providers in the evaluation of laryngeal pathology.

Methods: A systematic review was performed in EMBASE, MEDLINE, and Cochrane Central databases. Search terms included variations of “Deep Learning”, “Acoustics”, “Videoendoscopy” and “vocal disorders”. The initial search yielded 897 studies, 138 of which advanced to full-text screening. The inclusion criteria consisted of classifying vocal disorders using acoustics or imaging with a deep learning program. Reviews and animal studies were excluded.

Results: 35 studies met the inclusion criteria, with 19 focusing on speech recognition and 16 on imaging analysis. Across the 19 acoustic studies, 21 programs were used for identification of 22 voice disorders including organic, neurological, and malignant conditions. These technologies included 9 convolutional neural networks (CNNs), 4 multilayer perceptrons (MLPs), and 8 other neural networks. These systems had an overall accuracy of 91.74% in detecting pathologic voices from healthy ones, with MLP programs producing a 95.75% accuracy compared to 88.37% for CNNs. In the 16 imaging analysis studies, 19 programs were used with an overall accuracy of 90.45%, including 91.80% for 13 CNNs and 82.30% for 3 MLPs.

Conclusions: Deep learning models were shown to be highly accurate in the diagnosis of vocal pathology, with CNNs unsurprisingly outperforming MLPs in image analysis, as they are considered a superior technology for analyzing spatial relationships.

Too Deep: The Risk for Inappropriate Deep Resections While Practicing a Single Stage Laser Cordectomy

Hagit Shoffel-Havakuk, MD; Daniel Ben Ner, MD;
Tzvi Menachem Najman, MD; Yonatan Reuven, MD, PhD;
Nofar Ben-mordechai, MD; Dvir Yohai Bar-on, MD; Yaniv Hamzany, MD

Objective: Whenever a cordectomy is indicated, obviating preoperative biopsy and practicing a Single-Stage-Laser-Cordectomy (SSLC) may expedite treatment and preserve surgical planes. This may result in more superficial resections and improved vocal function. Yet, SSLC holds a risk for over-treating non-malignant lesions. This study aims to evaluate this risk.

Methods: A retrospective cohort of patients who underwent SSLC. Cordectomy types (ELS) were compared with final pathology. Type-1 cordectomy was sub-categorized into superficial-type-1 (superficial-lamina-propria preserved) and deep-type-1 (ligament exposed). Superficial-type-1 cordectomy was considered adequate for epithelial lesions not invading the basement membrane: non-malignant, dysplasia and carcinoma-in-situ. Deeper resections for these pathologies were considered inappropriately deep. All resections were considered appropriate for carcinoma (SCC).

Results: 97 patients who underwent 140 SSLC were included. SCC was found in 31%(N=43), CIS/severe-dysplasia in 15%(N=21), mild/moderate-dysplasia in 23%(N=32), benign in 31%(N=43) and lymphoma in 0.5%(N=1). Superficial-type-1 cordectomy was performed in 64%(N=89). Altogether, 15 lesions(11%) underwent inappropriately deep resections. Smoking history, current smoking status, prior glottic surgery, radiation or fungal infection, did not increase the risk for inappropriate deep resection. While the rate of inappropriately deep resection for superficial-type-1 cordectomies was 0%, for deep-type-1 cordectomy or deeper it was 29.4%. The highest rate was associated with deep-type-1 cordectomy, reaching 52.9%.

Conclusion: The general risk for inappropriately deep resection during a SSLC is low, yet this risk increases when the depth of resection involves exposure of the vocal ligament, or deeper resection. In order to avoid unnecessary morbidity, when deep resections are considered they can be accompanied by frozen section.

Tracheal Advancement for Reconstruction of the Hemi-Cricoid and Larger Cartilage Defects in the Management of Low-Grade Chondrosarcoma

Luis E. Cortina, BS; Matthew R. Naunheim, MD, MBA;
Allen L. Feng, MD; Mark A. Varvares, MD

Purpose: Surgery is the treatment of choice for laryngeal chondrosarcoma. Surgical excision in the larynx, however, is challenging as the goal of organ preservation must be maintained without compromising the oncological outcome. Here, we present a novel and effective application of tracheal advancement for the management of hemi-cricoid and larger cartilage defects in low-grade laryngeal chondrosarcoma.

Methods: A retrospective review of two patients with low-grade laryngeal chondrosarcoma treated with partial laryngectomy and unilateral tracheal advancement as reconstruction was performed. The oncological outcome, as well as functional factors such as the onset and quality of airway, speech, and deglutition were evaluated.

Results: Two patients underwent unilateral tracheal advancement with thyrotracheal anastomosis after partial laryngectomy for management of low-grade cricoid chondrosarcoma involving at least 50% of the cricoid cartilage structure with an average follow-up period of 28 months. There were no recurrences, both patients were decannulated, breathing comfortably, with no inspiratory stridor at rest. Both patients had easily intelligible voices; one patient with great volume and clarity and the other patient, with a low-pitched but stable voice. Patients had satisfactory swallowing, maintained weight, and took nutrition by mouth.

Conclusions: Tracheal advancement is a simple, effective, and safe method to reconstruct hemi-cricoid and cartilage defects in the management of low-grade laryngeal chondrosarcoma. The procedure was not associated with any oncological recurrences and demonstrated favorable functional results in both patients.

Transglottic Migration of Calcium Hydroxyapatite Injection Presenting as a Laryngeal Mass

Brian O. Hernandez, MD; Nina W. Zhao, MD, MAEd;
Peter C. Belafsky, MD, MPH, PhD

Background/Objectives: Calcium hydroxyapatite (CAHA) has been used for injection laryngoplasty (IL) since the early 2000's and is considered a safe and efficacious augmentation medium. Migration has been described transglottically, may be under reported and regarded as an infrequent complication. We present an unusual case of CAHA migration lateral to the ipsilateral arytenoid and aryepiglottic (AE) fold following IL.

Methods: Case report and literature review.

Results: A 58-year-old female presented with dysphonia and dysphagia following a preceding Coronavirus infection. Laryngeal videostroboscopy revealed bilateral vocal fold atrophy and left vocal fold paresis. The patient elected to proceed with IL using CAHA under general anesthesia. The procedure was uncomplicated with successful medialization of the left vocal fold using 0.85 cc of CAHA. At her first post-operative visit, delayed at 5 months, she reported increased Voice Handicap Index and Eating Assessment Tool scores. Repeat examination revealed a submucosal mass of the left arytenoid/AE fold. A computed tomography (CT) scan revealed migration of the CAHA implant corresponding to the location of the mass.

Conclusion: Evidence of macroscopic transglottic and microscopic lymphatic migration have been published. Though limited, these studies illustrate lymphatic migration in up to 66% of animal models and local malposition in up to 60% of patients, possibly related to migration. CAHA is frequently utilized in IL and regional migration must be considered when evaluating individuals with a poor response or new laryngeal mass. Additional evaluation is required to better understand how this migration occurs and who is at increased risk of such migration.

Trust in Machine Learning Driven Clinical Decision Support Tools among Otolaryngologists

Yu Han Chen, BS; Xiaoyue Ma, MS; Hal Rives, BS;
Aisha Serpedin, BS; Peter Yao, MD; Anais Rameau, MD, MPhil, MS

Background: Machine learning driven clinical decision support tools (ML-CDST) are on the verge of integrating clinical settings, including in Otolaryngology-Head & Neck Surgery. We aimed to investigate whether such CDST may influence otolaryngologists' diagnostic judgement, and assess the association between their understanding of the ML-CDST output and trust in it.

Methods: Otolaryngologists were recruited virtually across the United States. Participants were shown 12 different video-stroboscopic exams from patients with previously diagnosed laryngopharyngeal reflux or vocal fold paresis, and asked to determine the presence of disease. They were then exposed to a random diagnosis purportedly resulting from an ML-CDST and given the opportunity to revise their diagnosis. The ML-CDST output was presented with no explanation, a general explanation, or a specific explanation of its logic. The ML-CDST impact on diagnostic judgement was assessed with McNemar's test.

Results: Thirty-four participants were recruited. When participants reported less confidence (77 observations), they were significantly ($p=0.021$) more likely to change their diagnostic judgement after exposure to specific ML-CDST output compared to when they reported more confidence (55 observations). Participants were more likely to trust ML-CDST output and change their diagnostic judgement when presented with a specific explanation ($p=0.043$) compared to a general explanation of the CDST logic.

Conclusions: Our study suggests that otolaryngologists are susceptible to accepting ML-CDST diagnostic recommendations, especially when less confident. Otolaryngologists' trust in ML-CDST output is increased when accompanied with a specific explanation of its logic.

Type 1 Thyroplasty for Cough

Ari D. Schuman, MD, MSCR; Vishnu Narayna, BS;
Julina Ongkasuwan, MD

Introduction: Type 1 thyroplasty, as originally designed by Isshiki, is a surgical method to medialize the vocal folds in the setting of hypomobility, immobility, or atrophy. The primary presenting symptom in most patients is dysphonia. We discuss three patients in whom type 1 thyroplasty was performed primarily for cough and their subsequent outcomes.

Methods: Case series of three patients treated at a tertiary voice clinic.

Results: Patient 1 presented solely for evaluation of wet cough. Patients 2 and 3 presented with both dysphonia and cough. All three patients had some degree of vocal fold atrophy on exam. Patient 1 and patient 2 were both diagnosed with neurogenic cough that had improved with neuromodulators such as gabapentin and local anesthetics such as lidocaine. Patient 2 had a history of previous left vocal fold hypomobility at initial presentation and right sided hypomobility with normal left-sided movement five years later at the time of surgery. Patient 3 had dysphonia and cough associated with increased allergy symptoms with a glottic gap on laryngoscopy. Patients 1 and 3 underwent bilateral type 1 thyroplasties with GoreTex; patient 2 had a unilateral right GoreTex thyroplasty. All three patients had improvement in cough after thyroplasty. Patients 2 and 3 also had a noted improvement in dysphonia.

Conclusion: Type 1 thyroplasty is a viable treatment for neurogenic cough with vocal fold atrophy performed unilaterally or bilaterally. This case series shows the need for future prospective work to evaluate the role of thyroplasty in cough treatment.

Understanding the Diagnostic Odyssey for Idiopathic Subglottic Stenosis, A Rare Disease

Nainika Nanda, MD; Cara Damico Smith, MPH; Kemberlee Bonnet, MA;
David Schlundt, PhD; Catherine Anderson; Sara Fernandes-Taylor, PhD;
Alexander Gelbard, MD; David O. Francis, MD, MS

Introduction: Idiopathic subglottic stenosis (iSGS) is a rare and, often initially, misdiagnosed disease. iSGS patients have different Diagnostic Odysseys – the experience in healthcare systems from symptom onset to time to diagnosis (TTD). This mixed-methods study was designed to improve care of iSGS patients by elucidating influencers of shorter and longer diagnostic odysseys.

Methods: Semi-structured interviews were performed on a nested sample of patients from the North American Airway Collaborative using a rigorously developed interview guide developed based on the established Diagnostic Odyssey Framework and Ryvicker's Behavioral-Ecological Conceptual Framework to investigate factors that affect TTD and patient experience in the healthcare system. Interview transcripts were coded using directed content analysis and qualitative analysis was continued until thematic saturation.

Results: In all, the 30 iSGS patients included (female: 100%; white: 87%; mean age: 48 years) had a median TTD of 21 months (IQR 12-46), with 18 (60%) diagnoses ≥ 3 years after symptom onset. Misdiagnosis led to non-beneficial medical (n=25, 83%) and surgical interventions (n=4, 13%). Three themes from Ryvicker's framework were associated with TTD and odyssey efficiency: (1) patients' motivational characteristics, (2) patients' social environment and relationships, and (3) provider factors (e.g., provider-patient relationships and referral patterns).

Conclusion: Effective patient-provider relationships, provider referral patterns, and most importantly, patient social capital were important catalysts in decreasing TTD. Patient-reported medical paternalism and gatekeeping extended diagnostic odysseys. Our findings highlight the need to better understand the impact of patient relationships and referral patterns on TTD for iSGS.

Upper Airway Resistance and Clinical Respiratory Distress in Laryngeal Cancer: A Computational Fluid Dynamics Study

Thomas Hudson, MD; Rayane Ait Oubahou, MASc; Luc Mongeau, PhD;
Karen M. Kost, MD

Objective: Upper airway obstruction is a challenge for the airway surgeon. Airway protection can be critical, but avoidance of unnecessary tracheostomy must also be considered. Decision making regarding airway remains largely guided by subjective experience and training. This investigation aims to study the relationship between respiratory distress and airway resistance in laryngeal cancer as determined by computational fluid dynamic (CFD) and morphometric analysis.

Methods: Retrospective CT and clinical data were obtained for a series of 20 cases, defined as laryngeal cancer patients who required urgent airway management, and 20 controls. Cases and controls were matched based on T-staging. Image segmentation and morphometric analysis were first performed. Computational models were then created and used to quantify the continuous mass flow and constant static pressure inlet boundary conditions.

Results: The analysis demonstrated a significant relationship between airway resistance and acute obstruction (OR 1.018, 95% CI 1.001-1.045). Morphometric analysis similarly demonstrated a significant relationship when relating measurements based on the minimum cross-section, but not on length of stenosis. Morphometric measurements also showed significance in relating to CFD results, and their relationship demonstrated an exponential increase in airway pressures below 2.5 mm. Tumor subsite did not show a significant difference.

Conclusions: Airway resistance analysis from CFD computation correlated with presence of acute distress requiring emergent management. Morphometric analysis showed a similar correlation, demonstrating a radiologic airway assessment technique on which future risk estimation could be performed. This could be clinically helpful in deciding whether or not to intervene in borderline airways.

Use of the Exoscope in Endolaryngeal Surgery

Samir Ballestas, MD; Julio Hidalgo Lopez, MD;
Anthony Law, MD, PhD

Introduction: The use of the exoscope has gained popularity among surgical specialties due to its ability to deliver high definition images, adequate magnification, illumination and depth perception. Benefits such as surgeon's comfort, improved ergonomics, and decreased space requirements in comparison with traditional operative microscopes have been described. In this study we evaluate the feasibility of using an exoscope in endolaryngeal surgeries and compare it to the use of the operating microscope. In addition, we evaluate the accuracy of 3D reconstruction that the 3D camera capture allows.

Methods: 10 patients that underwent endolaryngeal surgery with the use of the exoscope. Surgery time as well as subjective assessment of image quality was obtained from the surgeon. The collected data was analyzed in 3D reconstruction software and multiple 3D reconstructions were created.

Results: Adequate exposure and proper visualization were obtained for all surgeries. In average, surgical times were comparable between the exoscope and the microscope. Images acquired were used for 3D reconstruction and subsequent measurements providing a more precise characterization of endolaryngeal disease.

Conclusion: The use of the exoscope provides adequate stereoscopic view. The lack of prolonged neck flexion and tension decreases the risk of fatigue and musculoskeletal lesions. Using the exoscope for endolaryngeal surgery is feasible and proven to be non-inferior to the use of the microscope providing 3D imaging, depth perception and adequate color contrast.

Vitamin D Receptor as Non-Invasive Predictor for Laryngeal Squamous Cell Carcinoma

Sarina Mueller, MD; Olaf Wendler, PhD; Johanne Schuster, DMD;
Ann-Christin Winkelmann, MS

Introduction: The vitamin D receptor (VDR) is responsible for the expression of numerous genes including cell proliferation and differentiation. Along with vitamin D itself it is subject of clinically driven research. However, its role as non-invasive marker for laryngeal squamous cell carcinoma (LSCC) has never been investigated. Therefore, the objective of this study was to analyze the potential of VDR as non-invasive serum marker for LSCC.

Methods: IRB approved study of n=75 LSCC and n=49 controls who all underwent a panendoscopy for tumor staging, a biopsy and blood sampling. According to the UICC staging system 8th version different stages of LSCC (stage I-IV) were included. VDR was analyzed in tissue using Immunohistochemistry (IHC) and Immunofluorescence (IF). In the following, results were validated using Western Blots (WB). Finally, serum VDR was analyzed using ELISA.

Results: VDR was significantly overexpressed in tissue of LSCC patients as shown in WB ($p=0.008$). Moreover, VDR was significantly overexpressed in serum of LSCC patients with higher serum levels in higher stages (e.g. T1/2 $p<0.045$, T3/4 $p<0.001$).

Conclusions: VDR showed a significant overexpression in tissue as well as in serum of LSCC patients in all stages. For this reason, VDR may be a potential non-invasive predictor for advanced stage LSCC but more importantly also for early stage LSCC. Further studies are needed to investigate the clinical meaningfulness.

Vocal Fold Polyp Recognition in Laryngoscopy Images using Deep Learning

Yeo Eun Kim, BA; Preethi Periyakoil, BS;
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Hortense Gimonet, MS; Lucian Sulica, MD; Hayley Born, MD
Olivier Elemento, PhD; Josue Barnes, BS; Anais Rameau, MD, MPhil

Objectives: This study aims to develop and validate a deep-learning model for distinguishing healthy vocal folds (HVF) and vocal fold polyps (VFP) on laryngoscopy videos while demonstrating the ability of an in-house informative frame classifier to facilitate deep learning development.

Methods:
129 videos were analyzed, 52 of HVF and 77 with unilateral VFP. Frames from these videos were extracted and subsequently manually labeled by two researchers as informative or uninformative. An informative frame classifier was also used to extract informative frames from the same video set. Both sets of frames were independently divided into training (60%), validation (20%), and test sets (20%).
Two models, pre-trained on ResNet-18, were trained on each dataset using transfer learning to classify frames as containing HVF or VFP. The accuracy of the polyp classifier trained on the machine-labeled informative frames was compared to that of the polyp classifier trained on the human-labeled informative frames.

Results: The polyp classifier trained on the machine-labeled informative frames achieved an accuracy of 88% and precision, recall, and F1-score of 82%, 96%, and 88%, respectively, whereas the classifier trained on the human-labeled informative frames achieved an accuracy of 80% and precision, recall, and F1-score of 80%, 83%, and 81%, respectively, when evaluated on a hold-out test set.

Conclusion: We developed an accurate deep-learning classifier for VFP identification with the assistance of a novel informative frame classifier for dataset assembly. The accuracy of the classifier trained on machine-labeled informative frames demonstrates improved performance compared to the classifier trained on human-labeled frames.

Vocal Health Knowledge among Music Students: Initial Survey and Longitudinal Educational Programming Initiatives

Ashley P. O'Connell Ferster, MD; Mara Culp, PhD; Paul Allen, PhD

Background/Objectives: For musicians pursuing careers that will classify them as professional voice users, an understanding of vocal health and an improved awareness of their voice is critical for career longevity. However, little is known about incoming music students' knowledge of vocal health and the efficacy of educational programming to improve this knowledge. This on-going study seeks to determine undergraduate and graduate music students' baseline knowledge of vocal health and current levels of functioning, and will also evaluate the effects of educational programming on students' knowledge of vocal health.

Methods: Incoming undergraduate and graduate students at a school of music in Northeastern United States completed an online questionnaire that included questions about vocal health knowledge (VHK), the Voice Handicap Index-10 (VHI-10), and demographic information. Here we report on baseline knowledge and vocal function.

Results: Among respondents ($N = 40$), the mean VHI score was 8.15 ($SD = 7.628$, Range = 0-34, $n = 39$). Out of a potential 16 points, the mean VHK score was 11.97 ($SD = 2.860$, Range = 3-15, $n = 40$). VHI was marginally worse amongst graduate students (9.42, $n = 19$) than undergraduate students (6.95, $n = 20$), though this difference was not significant ($p > 0.05$).

Conclusions: Initial findings of this ongoing study indicate that music students enter programs with baseline knowledge of vocal health, as well as potential vocal health issues. Music students with high voice demands show evidence of voice impairment that could benefit from education to improve and implement practices to promote vocal health.

Voice and Swallowing Dysfunction in Patients with Inhalation Injury

Anita Sulibhavi, MD; Lisa Rae, MD; Maria Striano, MA, CCC-SLP;
Caitlin Chambers, MA, CCC-SLP; Alyse Vuolo, MA, CCC-SLP;
Ahmed Soliman, MD

Background/Objectives:: Data regarding laryngeal dysfunction among patients with inhalation injury is scarce. This study aims to evaluate voice and swallowing function and laryngeal findings in patients admitted with inhalation injuries to a regional burn unit.

Methods: A retrospective case series with chart review was performed of all patients admitted with inhalation injury from 2018 to 2021, totaling 50 patients. Patient demographics, hospital course, endoscopic findings, and swallowing evaluations were collected. A follow-up phone call was made after discharge to assess current functional status using the Dyspnea Index, Voice Handicap Index, and EAT-10 surveys.

Results: 50 patients were identified of which 41(82%) were intubated during admission. The average length of intubation was 7.7 days. 10 (24.3%) of these patients required tracheostomy. 40 patients (80%) underwent flexible laryngoscopy during admission, most commonly within 24 hours of extubation. 32/40 patients evaluated had abnormal findings. Of these, all 32 subjectively reported dysphagia or dysphonia and 28 (87.5%) reported both. 60% of patients underwent instrumental swallow evaluation while admitted. 8 patients attended outpatient follow-up with otolaryngology, of whom 75% had abnormal findings on outpatient laryngoscopy. 4/8 patients required additional airway surgeries.

Conclusions: Inhalation injuries are common in patients admitted to the burn unit. Most had abnormal findings on laryngoscopy which were associated with voice and/or swallowing complaints. Patient symptoms were predictive of an abnormal laryngoscopy. Efforts at understanding these relationships may help improve long-term management of inhalation injuries

Zoom In: External Factors Affecting Vocal Habits During Online Meetings, A Prospective Trail on 25 Subjects

Sapir Pinhas, MD; Hagit Shoffel-Havakuk, MD

Background: The usage of online video meeting applications increased remarkably. We aim to identify factors that influence vocal habits during those meetings.

Methods: A prospective study on Hebrew native-speaking volunteers, who speak English as a second language and are familiar with Zoom meetings. Subjects participated in a Zoom meeting, divided into six randomly ordered sections, with alterations in audio/speaking equipment and language: (1)computer's speaker & microphone without video; (2)computer's speaker & microphone with video; (3)computer's speaker & microphone with video, conversing in English; (4)a single earbud & its microphone with video; (5)two earbuds & their microphone with video; (6) headphones &their microphone with video. Each section included free speech, sustained phonation, and a standard passage. For each section: participants' ranked their vocal effort on 0 to 4 Likert scale; 3 blinded raters independently scored by GRBAS scale; and acoustic analyses measures were examined, such as fundamental frequency(F0), and intensity.

Results: 25 participants were recruited. No difference in vocal effort ranking was demonstrated between sections. Speaking in a second language resulted in significantly increased intensity ($p=0.004$) and GRBAS scores ($p=0.044$). Using the computer's speaker & microphone resulted in a significant increase in intensity ($p=0.001$) and F0 ($p=0.003$). No significant differences were detected between usage of headphones, a single or two earbuds; also between with or without video. The study is still ongoing and more subjects are recruited; the results at COSM will be updated accordingly (subtle differences might be detected).

Conclusions: Using computer's microphone & speaker or speaking in a second language, during online video meetings, may result in vocal habits associated with vocal trauma.

MEMORIALS

Dr. James Byron Snow Jr. March 12, 1932 – May 28, 2022

The Association was notified of the passing of Dr. James B. Snow Jr., on May 28, 2022 at his home in West Grove, Pennsylvania. Dr. Snow was inducted as an Active Fellow in 1974, served with as the ALA President in 1990 and elevated to Emeritus status in 1995.

Born in Oklahoma City, his family moved to San Antonio, Texas while his father, a prominent pediatrician, was stationed at Brooke General Hospital during World War II. Receiving his undergraduate degree with distinction from the University of Oklahoma in 1953, Dr. Snow earned his M.D. cum laude from Harvard Medical School in 1956 and completed his surgical internship at Johns Hopkins Hospital and his residency in otolaryngology at the Massachusetts Eye and Ear Infirmary.

On July 16, 1954, he married Sallie Lee Ricker in Tulsa, Oklahoma and from this union, two sons (James B. III, John Andrew) and one daughter, (Sallie) were born. Dr. Snow served as a Captain in the Army Medical Corps at the 121st Evacuation Hospital in Korea where he was the only otolaryngologist in the Eighth US Army in 1960. Following his military service, Dr. Snow joined the University of Oklahoma Medical Center faculty and rose to the rank of Professor and Head of the Department of Otorhinolaryngology. In 1972, he assumed the same position at the University of Pennsylvania School of Medicine in Philadelphia. The author of numerous books, including *Introduction to Otorhinolaryngology*, and *Controversy in Otolaryngology*, he edited several editions of *Ballenger's Otorhinolaryngology Head and Neck Surgery* including the 100th anniversary edition.



Dr. Snow was active in organized medicine by serving as a Director of the American Board of Otolaryngology, and Regent of the American College of Surgeons. He became the first Director of the National Institute on Deafness and Other Communication Disorders of the National Institutes of Health and successfully organized the new Institute. In 1991, Dr. Snow was inducted into the Society of Scholars of Johns Hopkins University, and in 1993 he received the Distinguished Achievement Award of the Deafness Research Foundation. Dr. Snow received the Senior Executive Service Presidential Meritorious Executive Rank Award for his government service. Following retirement in 1997, he continued to be active in professional organizations. As a tribute to his service as Convener/Correspondent of the Tinnitus Research Consortium, the James B. Snow, Jr., M.D. Tinnitus Research Award was established in his honor by the Collegium Oto-Rhino-Laryngologicum Amicitiae Sacrum. In 2003, he received the Award of Merit of the American Otological Society.

Nobuhiko Isshiki, MD
c. 1929 – August 14, 2021

Dr. Nobuhiko Isshiki was inducted as a Corresponding Fellowship in the 1950's. Due to the Association not having a category for Corresponding Fellows who retired from their practice until 2015, this group of fellows resigned. The Association was notified of his passing on August 14, 2021 at his home in Kyoto, Japan.

Dr. Isshiki was recognized as a pioneer of phonosurgery who developed a series of surgical procedures to improve the voice of patients with vocal fold paralysis, atrophy, after laryngeal trauma, pitch problems and recently Spasmodic Dysphonia. He received his medical degree from Kyoto University Medical School in 1954 followed by an appointment to the Kyoto University ENT department in 1955 where he practiced both clinical and experimental works that continued for 2 years at UCLA in Dr. von Leden's lab.

After he returned home, he made an intensive research into the mechanism of phonation using the excised larynges and achieved the rank of associate professor and in 1977 was promoted to professor in 1980. Based on the results, he newly developed the Laryngeal Framework Surgery, which permits the change in the position and tension of the vocal fold without touching it.



In 1993, Dr. Isshiki returned from the University. Dr. Isshiki was also recognized internationally for his work – receiving awards at the Gould Award, Gutzmann's Award for Clinical Laryngeal research and the Isshiki Award from Royal Society of Surgeons in England. Following retirement from the University in 1993, he was the head of the Isshiki Clinic (the Kyoto Voice Surg. Center), and refined phonosurgical procedures.

In 2021, he was presented the American Laryngological Association Award by ALA President Paul Flint.

JACK L. GLUCKMAN, MD
August 25, 1945- September 7, 2022

The Association was notified that a valuable Fellow, Dr. Jack L. Gluckman, passed on September 7, 2022 at his home in Hyde Park Ohio. Dr. Gluckman was proposed for Active Fellowship by Drs. Eugene Myers and Lauren Holinger in 1991. He requested a change to Emeritus Fellowship and was granted the elevation in 2010.

Born and raised in Cape Town, South Africa, Dr. Gluckman graduated from the University of Cape Town with his medical degree in 1967. He would immigrate to the United States in 1977 where he was accepted into the fellowship training program in head and neck oncology at the University of Cincinnati Medical School. Upon completion of this training, Dr. Gluckman was appointed to the rank of assistant professor. In 1985, he became a tenured professor and six years later, he was appointed the department's chairperson.

Considered a giant in his field of head and neck oncologic surgery, Dr. Gluckman served on several board of directors of numerous academic societies. As the author of ten books – many of which are used in today's academic programs of otolaryngology. He also authored or co-authored 290 scientific papers. Among the many prestigious awards he was presented, he received the Drake Medal that is the highest award offered by the University of



Cincinnati and an Honorary Fellowship from the Royal College of Surgeons of Edinburgh for contributions to cancer surgery. However, Dr. Gluckman was most proud of the local Health Care Hero Award for Best Clinical Practitioner bestowed upon him.

Dr. Gluckman showed much compassion toward his patients while exhibiting a huge degree of human and candor. Recognized as a central figure in the lives of so many, Dr. Gluckman's circle of friends was immeasurable.

He loved traveling the world with his wife and family especially on safari in his beloved home country, Africa and to his home in Lake Tahoe. Not only was he passionate and skilled in surgery, he loved to fly fish, golf and ski or spending time watching the Cincinnati Bengals

SID KHOSLA, MD
October 1, 1962 - December 13, 2022

The Association was notified that Dr. Sid Kholsa, a valuable Fellow, passed away unexpectedly on December 13, 2022, at his home in Cincinnati, Ohio. Proposed for Active Fellowship by Drs. Randal Paniello and Albert Merati, he was inducted in 2014.

Born in Rosetown, Saskatchewan, Canada, Dr. Khosla received his undergraduate degree in mechanical engineering from the Massachusetts Institute of Technology in 1985. He continued his education by earning a master's degree in Biomechanics at the University of California-San Diego in 1987. In 1991, Dr. Khosla earned his medical degree from the Bowman Gray School of Medicine at Wake Forest University. Sid was accepted in the otolaryngology residency and fellowship training programs at Washington University School of Medicine at St. Louis. After completing his post-graduate training with a fellowship in laryngology and voice disorders, Dr. Khosla was appointed an assistant professor at the Medical College of Ohio (Toledo) where he served for two years. In 2004, he was appointed as assistant professor at the University of Cincinnati Medical Center where he became the first laryngologist in that region.

A respected leader in voice, vocal cord, and swallowing disorders research, Sid received six R01 grants from the NIH and



more than \$12 million in total research funding. His training as a mechanical engineer with a master's degree in bioengineering allowed him to approach voice problems both as an engineer and a physician. Many of his colleagues remarked that collaborating with Sid was more valuable than any other experience they had. Discussing new ideas, studying new approaches and being able to analyze from different perspectives was enhanced by the easiness to communicate with Sid.

Dr. Khosla was truly a renaissance man whose loss will be felt by all who worked with him and had the opportunity to know him.

OFFICERS 1879 - 2023

Presidents

1879	Louis Elsberg	1912	George A. Leland	1954	Henry B. Orton
1880	J. Solis-Cohen	1913	Thomas Hubbard	1955	Bernard J. McMahon
1881	F. I. Knight	1914	Alexander W. MacCoy	1956	LeRoy A. Schall
1882	G. M. Lefferts	1915	G. Hudson Makuen	1957	Harry P. Schenck
1883	F. H. Bosworth	1916	Joseph L. Goodale	1958	Fred W. Dixon
1884	E. L. Shurly	1917	Thomas H. Halsted	1959	William J. McNally
1885	Harrison Allen	1918	Cornelius G. Coakley	1960	Edwin N. Broyles
1886	E. Fletcher Ingals	1919	Norval H. Pierce	1961	Dean M. Lierle
1887	R. P. Lincoln	1920	Harris P. Mosher	1962	Francis E. LeJeune
1888	E. C. Morgan	1928	Charles W. Richardson	1963	Anderson C. Hilding
1889	J. N. Mackenzie	1929	Lewis A. Coffin	1964	Albert C. Furstenberg
1890	W. C. Glasgow	1930	Francis R. Packard	1965	Paul A. Holinger
1891	S. W. Langmaid	1931	George E. Shambaugh	1966	Joel J. Pressman
1892	M. J. Asch	1932	George Fetterolf	1967	Lawrence R. Boies
1893	D. Bryson Delavan	1933	George M. Coates	1968	Francis W. Davison
1894	J. O. Roe	1934	Dunbar Roy	1969	Alden H. Miller
1895	W. H. Daly	1935	Burt R. Shurly	1970	DeGraaf Woodman
1896	C. H. Knight	1936	William B. Chamberlain	1971	F. Johnson Putney
1897	T. R. French	1937	John F. Barnhill	1978	John F. Daly
1898	W. E. Casselberry	1938	George B. Wood	1979	John A. Kirchner
1899	Samuel Johnston	1939	James A. Babbitt	1980	Daniel Miller
1900	H. L. Swain	1940	Gordon Berry	1981	Harold C. Tabb
1901	J. W. Farlow	1941	Thomas E. Carmody	1982	M. Stuart Strong
1902	J. H. Bryan	1942-43	Charles J. Imperatori	1983	John S. Lewis
1903	J. H. Hartman	1944-45	Harold I. Lillie	1984	Gabriel F. Tucker, Jr
1904	C. C. Rice	1946	Frank R. Spencer	1985	Douglas P. Bryce
1905	J. W. Gleitsmann	1947	Arthur W. Proetz	1986	Loring W. Pratt
1906	A. W. de Roaldes	1948	Frederick T. Hill	1987	Blair Fearon
1907	H. S. Birkett	1949	Ralph A. Fenton	1988	Seymour R. Cohen
1908	A. Coolidge, Jr	1950	Gordon B. New	1989	Eugene N. Myers
1909	J. E. Logan	1951	H. Marshall Taylor	1990	James B. Snow, Jr
1910	D. Braden Kyle	1952	Louis H. Clerf	1991	John M. Fredrickson
1911	James E. Newcomb	1953	Gordon F. Harkness	1992	William R. Hudson

1993	Byron J. Bailey	2003	W. Frederick McGuirt, Sr.	2013	C. Gaelyn Garrett
1994	H. Bryan Neel III	2004	Robert H. Ossoff	2014	Mark S. Courey
1995	Paul H. Ward	2005	Robert T. Sataloff	2015	Peak Woo
1996	Robert W. Cantrell	2006	Gayle E. Woodson	2016	Kenneth Altman
1997	John A. Tucker	2007	Marshall Strome	2017	Gady Har-El
1998	Lauren D. Holinger	2008	Roger I. Crumley	2019	C. Blake Simpson
1999	Gerald B. Healy	2009	Marvin P. Fried	2020-21	Paul W. Flint
2000	Harold C. Pillsbury III	2010	Andrew Blitzer	2022	Clark A. Rosen
2001	Stanley M. Shapshay	2011	Michael S. Benninger	2023	Lucian Sulica
2002	Gerald S. Berke	2012	Clarence T. Sasaki		
1921	Harmon Smith	1972	Frank D. Lathrop		
1922	Emil Mayer	1973	G. Slaughter Fitz-Hugh		
1923	J. Payson Clark	1974	Joseph H. Ogura		
1924	Lee Wallace Dean	1974	Daniel C. Baker Jr		
1925	Greenfield Sluder	1975	Stanton A. Friedberg		
1226	Chevalier Jackson	1976	Charles M. Norris		
1927	D. Bryson Delaan	1977	Charles T. Ferguson		

Vice Presidents (First and Second)

1879	F.H. Davis	1929	William B. Chamberlin, Ralph A. Fenton
1880	W. C. Glasgow, J. O. Roe	1930	Harris P. Mosher, James A. Babbitt
1881	E. L. Shurly, W. Porter	1931	Joseph B. Greene, E. Ross Faulkner
1882	C. Seiler, E. F. Ingals	1932	Gordon Berry, Frank R. Spencer
1883	S. W. Langmaid, S. Johnston	1933	E. Ross Faulkner, Thomas S. Carmody
1884	J. H. Hartman, W. H. Daly	1934	Fordon B. New, Samuel McCullagh
1885	H.A. Johnson, G. W. Major	1935	Edward C. Sewall, H. Marshall Taylor
1886	E. C. Morgan, J. N. Mackenzie	1936	William P. Wherry, Harold I. Lillie
1887	J. N. Mackenzie, S. W. Langmaid	1937	Frank R. Spencer, Bernard J. McMahon
1888	W. C. Glasgow, C. E. DeM. Sajous	1938	Ralph A. Fenton, Frederick T. Hill
1889	F. Holden, C.E. Bean	1939	John H. Foster, Thomas R. Gittins
1890	J. O. Roe, J. H. Hartman	1940	Charles H. Porter, Gordon F. Harkness
1891	M. J. Asch, S. Johnston	1941	Arthur W. Proetz, Henry B. Orton
1892	S. Johnston, J. C. Mulhall	1942-3	Harold I. Lillie, Dean M. Lierle
1893	J. C. Mulhall, W. E. Casselberry	1944-5	John J. Shea, Thomas C. Galloway
1894	C.C.Rice, S. H. Chapman	1946	H. Marshall Taylor, C. Stewart Nash
1895	J. Wright, A. W. de Roaldes	1947	John J. Shea, Frederick A. Figi
1896	T. M. Murray, D. N. Rankin	1948	Henry B. Orton, Anderson C. Hilding
1897	A. W. MacCoy, H. S. Birkett	1949	LeRoy A. Schall, Fletcher D. Woodward
1898	J. W. Farlow, F.W. Hinkel	1950	W. Likely Simpson, Lyman, G. Richards
1899	T. A. DeBlois, M. R. Brown	1951	William J. McNally, Thomas C. Galloway
1900	H. L. Wahner, A. A. Bliss	1952	J. MacKenzie Brown, Edwin N. Broyles
1901	J. W. Gleitsmann, D. Braden Kyle	1953	Claude C. Cody, Daniel S. cunning
1902	G.A. Leland, T. Melville Hardie	1954	James H. Maxwell, Clyde A. Heatly
1903	J. H. Lowman, W. Peyre Porcher	1955	Robert L. Goodale, Paul H. Holinger
1904	Thomaso Hubbard, W. J. Freeman	1956	Henry M. Goodyear, Robert E. Priest
1905	J. L. Goodale, C. W. Richardson	1957	Frances H. LeJeune, Pierre P. Viole
1906	G. H. Makuen, A. R. Thrasher	1958	Charles Blassingame, Chevalier L. Jackson
1907	J. P. Clark, J. E. Rhodes	1959	James H. Maxwell, Oliver Van Alyea
1908	E. Mayer, F. R. Packard	1960	Walter Theobald, Anderson C. Hilding
1909	C. G. Coakley, H. O. Moser	1961	Julius W. McCall, P. E. Irlend
1910	Robert C. Myles, J. M. Ingersoll	1962	Paul M. Moore, Jerome A. Hilger
1911	F. C. Cobb, B. R. Shuly	1963	Paul M. Holinger, Lester A. Brown
1912	A. W. Watson, W. Scott Renner	1964	B. Slaughter Fitz-Hugh, Daniel C. Baker
1913	F. E. Hopkins, George E. Shambaugh	1965	C. E. Munoz-McCormick, Arthur J. Crasovaner
1914	Clement T. Theien, Lewis A. Coffin	1966	Lawrence R. Boies, G. Edward Tremble
1915	J. Gordon Wilson, Christian R. Holmes	1967	John F. Daly, Stanton A. Friedberg
1916	Thomas H. Halsted, Greenfield Sluder	1968	DeGraaf Woodman, John Murtagh
1917	John Edwin Rhodes, D. Crosby Greene	1969	Joseph P. Atkins, Stanton A. Friedberg
1918	George E. Shambaugh, John R. Winslow	1970	Robert B. Lewy, Oliver W. Suehs
1919	Francis R. Packard, Harmon Smith	1970	James A. Harrill, James D. Baxter
1920	Harmon Smith, W. B. Chamberlin	1972	Francis L. Weille, Sam H. Sanders
1921	Dunbar Roy, m Robert C. Lynch	1973	William H. Saunders, Blair Fearon
1922	George Fetterolf, Lorenzo B. Lockard	1974	Joseph H. Ogura, Douglas P. Bryce, John A. Kirchner
1923	Hubert Arrowsmith, Joseph B. Greene	1975	S. Lewis, Edwin W. Cocke, Jr.

Vice Presidents (First and Second)

1924	Ross H. Skillern, Gordon Berry	1976	Emanuel M. Skolnik, John T. Dickinson
1925	John E. Mackenty, Robert Levy	1977	J. Ryan Chandler, Herbert H. Dedo
1926	Lewis A. Coffin, William V. Mullin	1978	John E. Bordley, Lester A. Brown
1927	Charles W. Richardson, Hill Hastings	1979	Albert H. Andrews, Seymour R. Cohen
1928	Robert Cole Lynch, Francis P. Emerson	1980	John Frazer, George A. Sisson

Vice-Presidents (Presidents-Elect)

1981	M. Stuart Strong	1994	Paul H. Ward	2007	Roger L. Crumley
1982	John S. Lewis	1995	Robert W. Cantrell	2008	Marvin Fried
1983	Gabriel F. Tucker, Jr	1996	John A. Tucker	2009	Andrew Blitzer
1984	Douglas P. Bryce	1997	Lauren D. Holinger	2010	Michael Benninger
1985	Loring W. Pratt	1998	Gerald B. Healy	2011	Clarence T Sasaki
1986	Blair Fearon	1999	Harold C. Pillsbury, III	2012	C. Gaelyn Garrett
1987	Seymour R. Cohen	2000	Stanley M. Shapshay	2013	Mark S. Courey
1988	Eugene N. Myers	2001	Gerald S. Berke	2014	PeakWoo
1989	John B. Snow, Jr.	2002	W. Frederick McGuirt, Sr.	2015	Kenneth Altman
1990	John M. Frederickson	2003	Robert H Ossoff	2016	Gady Har-El
1991	William R. Hudson	2004	Robert T. Sataloff	2017	C. Blake Simpson
1992	Byron Bailey	2005	Gayle Woodson	2018	Paul W. Flint
1993	H. Bryan Neel III	2006	Marshall Strome	2019-20	Clark A. Rosen
				2021	Lucian Sulica

Secretaries and Treasurers

1879	G. M. Lefferts	1889	C. H. Knight	1900	P. E. Newcomb
1882	D. Bryson Delavan	1895	H. L. Swain	1911	Harmon Smith

Secretaries

1879	G.M. Lefferts	1952	Harry P. Schenck
1882	D. Bryson Delavan	1957	James H. Maxwell
1889	C. H. Knight	1959	Lyman G. Richards
1895	H. L. Swain	1968	Frank D. Lathrop
1900	P.E. Newcomb	1972	John F. Daly
1911	Harmon Smith	1977	William M. Tribble
1919	J. M. Ingersoll	1982	Eugene N. Myers
1920	George M. Coates	1988	H. Bryan Neel III
1933	William V. Mullin	1993	Gerald B. Healy
1935	James A. Babbitt	1998	Robert H. Ossoff
1939	Charles J. Imperatori	2003	Marvin P. Fried
1942	Arthur W. Proetz	2008	C. Gaelyn Garrett
1947	Louis H. Clerf	2012	Gady Har-El
		2017	Lucian Sulica

Librarian and Historian

1936	George M. Coates	1944	Louis H. Clerf
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Librarian, Historian and Editor

1947	Harry P. Schenck	1971	Charles F. Ferguson	1997	Stanley M. Shapshay
1952	Bernard J. McMahon	1977	Gabriel F. Tucker, Jr	2000	Gayle E. Woodson
1955	Edwin N. Broyles	1983	James B. Snow, Jr	2005	C. Gaelyn Garrett
1960	Francis W. Davison	1989	Paul Paul H. Ward	2008	Mark S. Courey
1964	F. Johnson Putney	1994	ErneErnest A. Weymuller, Jr		

Historian

2010	Robert H. Ossoff	2015	Michael S. Benninger
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DECEASED FELLOWS

Dates indicate original election to the Association

Active Fellows

1946	Alonso, Justo M., Montevideo, Uruguay	1914	Levy, Robert, Denver, CO
1992	Aschan, Gunnar K., Linköping, Sweden	1918	Lewis, Fielding O., Media, PA
1908	Barnhill, John F., Miami Beach, FL	1933	Lierle, Dean M., Iowa City, IA
1983	Birkett, Herbert S., Montreal, CN	1883	Mackenzie, John N., Baltimore, MD
1878	Bosworth, Francke H., New York, NY	1881	Mackenzie, Sir Morell, London, ENG
1940	Broyles, Edwin N., Baltimore, MD	1910	Masser, Ferdinand, Naples, Italy
1917	Coates, George M., Philadelphia, PA	1904	Mosher, Harris P., Marblehead, MA
1925	Clerf, Louis H., St Petersburg, FL	1910	Moure, J. J. E., Bordeaux, France
1957	Conley, John J., New York, NY	1937	Nager, F. R., Zurich, Switzerland
1960	Daly, John F., Fort Lee, NJ	1930	Negus, Sir Victor E., London, ENG
1818	Dean, Lee Wallace, St Louis, MO	1818	Oliver, H. K., Boston, MA
1881	Delavan, D. Bryson, New York, NY	1957	Ono, Jo, Tokyo, Japan
1891	De La Sota y Lastra, Ramon, Seville, Spain	1906	Pierce, Norval Harvey, San Diego, CA
1893	de Roaldes, Arthur W., New Orleans, LA	1937	Portmann, Georges, Bordeaux, France
1923	Fenton, Ralph A., Portland, OR	1924	Proetz, Arthur C., St Louis, MO
1879	French, Thomas R., Brooklyn, NY	1957	Ruedi, Luzius, Zurich, Switzerland
1936	Galloway, Thomas C., Evanston, IL	2021	Sasaki, Clarence, New Haven, CT
1880	Garcia, Manuel, London, ENG	1932	Schall, LeRoy A., Boston, MA
1986	Gould, Wilbur J., New York, NY	1909	Semon, Sir Felix, Great Missenden, England
1903	Harris, Thomas J., New York, NY	1878	Solis-Cohen, J., Philadelphia, PA
1971	Harrison, Sir Donald F. N., Surrey, England	1973	Som, Max L., New York, NY
1943	Hilding, Anderson C., Duluth, MN	1889	Swain, Henry L., New Haven, CT
1928	Hill, Frederick T., Waterville, ME	1914	Thomson, Sir St Clair, London, ENG
1948	Holinger, Paul H., Chicago, IL	1903	Tilley, Herbert, London, ENG
1957	Huizinga, Eelco, Groningen, the Netherlands	1914	Wagner, Clinton, New York, NY
1907	Jackson, Chevalier, Schwenksville, PA	1948	Williams, Henry L., Rochester, MN
1878	Johnston, Samuel, Baltimore, MD	1951	Woodman, DeGraaf, New York, NY
2022	Khosla, Sid MD, Cincinnati, OH	1890	Wright, Jonathan, Pleasantville, NY
1878	Lefferts, George Morewood, Katonah, NY		

Deceased Fellows

Corresponding Fellows

1978	Arauz, Juan Carlos, Buenos Aires, Argentina	1902	Lermoyez, Marcel, Paris, France
1972	Arslan, Michele, Padua, Italy	1897	Luc, H., Paris, France
1942	Batson, Oscar V., Philadelphia, PA	1970	Macbeth, Ronald G., Oxford, England
1938	Blair, Vilray P., St Louis, MO	1896	MacDonald, Greville, Haslemere, England
1892	Browne, Lennox, London, England	1894	MacIntyre, John, Glasgow, Scotland
2018	Benjamin, Bruce, Killara, AUSTRALIA	1903	McBride, P., York, England
1968	Cawthorne, Sir Terence, London, England	1920	McKenzie, Dan, London, England
1964	Cleves, Carlos, Bogota, Colombia	1919	McKernon, James F., New Canaan, CT
1940	Colledge, Lionel, London, England	1880	Meyer, Wilhelm, Copenhagen, Denmark
1901	Collier, Mayo, Kearsney Abbey, Kent, England	1896	Mygind, Holger, Copenhagen, Denmark
1893	Desvernine, Carlos M., Havana, Cuba	2011	Murakami, Yasushi, Kyoto, JAPAN
1966	Dohlgan, Gösta, East Bradenton, FL	1950	Neil, James Hardie, Auckland, New Zealand
1943	Eggston, Andrew A., New York, NY	1919	Paterson, Donald Rose, Cardiff, Wales
1930	Emerson, Francis P., Franklin, MA	1941	Patterson, Norman, Herts, England
1961	Faaborg-Anderson, Kund, Nykobing, Denmark	1971	Rethi, Aurelius, Budapest, Hungary
2007	Fonseca, Rolando, Buenos Aires, Argentina	1919	Rogers, John, Jr, New York, NY
1936	Fraser, John S., Edinburgh, UK	1894	Sajous, C. E. DeM., Philadelphia, PA
1887	Gougenheim, A., Paris, France	1924	Schaefer, J. Parson, Philadelphia, PA
1901	Grant, Sir James Dundas, London, England	1896	Schmiegelow, Ernst, Copenhagen, Denmark
2017	Hirano, Minoru, Kurume, JAPAN	1946	Segura, Eliseo, Buenos Aires, Argentina
1984	Holden, Edgar, Newark, NJ	1940	Soto, E. Fernandez, Havana, Cuba
1970	Hutcheon, Jack R., Brisbane, Australia	1881	Thornton, Pugin, London, England
1985	Inouye, Tetsuzo, Saitama, Japan	1913	Turner, A. Logan, Edinburgh, UK
2022	Isshiki, Nobuhiko, Kurme, Japan	1936	Vialle, Jacques, Nice, France
1919	Kelly, Adam Brown, Helensburgh, Scotland	1880	Whistler, W. McNeil, London, England
1978	Kleinsasser, Oskar, Marburg, Germany	1901	Wingrave, Wyatt, Lyme Regis, England
1881	Labus, Carlo, Milan, Italy	1894	Wolfenden, R. Norric, Kent, England
1950	Larsell, Olof, Portland, OR		
1931	LaSagna, Francesco, Parma, Italy		
1926	Law, Frederick M., New York		
1921	LeMaitre, Ferdinand, Paris		

Deceased Fellows

Emeritus Fellows

Alford, Bobby – Houston, TX	Dixon, Fred W – Shaker Heights, OH	Hinkel, Frank Whitehill, Buffalo, NY
Arnold, Godfrey – Clinton, MS	Eagle, Watt W – New Bern, NC	Hoople, Gordon D., Syracuse, NY
Ausband, John – Beaufort, SC	Erich, John H – Rochester, MN	Hopkins, Frederick E., Springfield, MA
Adams, George L., Excelsior, MN	Farlow, John W – Boston, MA	Houser, Karl M., Ardmore, PA
Alfaro, Victor R., Washington, DC	Fearon, Blair – Don Mills, CANADA	Hubbard Thomas – Toledo, OH
Allen, Harrison, Philadelphia, PA	Ferguson, Charles F – Sarasota, FL	Hurd, Lee M. – Rowayton, CT
Andrews, Albert – Chicago, IL	Figi, Frederick – Rochester, MN	Imperaton, Charles – Essex, NY
Ballenger, Howard, C – Winnetka	Fitz-Hugh, G. Slaughter – Charlottesville, VA	Ingersoll, John – Miami, FL
Barlow, Roy A. – Scotia, CANADA	Forbes, Henry H – New York, NY	Ireland, Percy – Toronto, CANADA
Barnes, Harry A. – Kingston, MA	Foster, John – Houston, TX	Jake, Geza – Melrose, MA
Beatty, Hugh O. – Columbus, OH	Fraser, John – Rochester, NY	Jarvis, DeForest – Barre, VT
Beck, Joseph C., Chicago, IL	Freer, Otto T – Chicago, IL	Johnston, William II – Santa Barbara, CA
Berry, Gordon, Worcester, MA	Friedberg, Stanton A – Chicago, IL	Kashima, Haskins, Lutherville, MD
Biller, Hugh,	Furstenberg, Albert – Ann Arbor, MI	Kelly, James – Baltimore, MD
Boies, Lawrence R – Minneapolis, MN	Gatewood, E. Tribble – Richmond, VA	Kelly, Joseph – New York, NY
Boles, Roger	Gittins, Thomas, R – Sioux City, IA	Kenyon, Elmer – Chicago, IL
Bordley, John E., Baltimore, MD	Gleitsmann, Joseph - New York, NY	Keman, John D – New York, NY
Bowers, Wesley C. – New York, NY	Goldman, Joseph - New York, NY	King, James – Atlanta, GA
Broniatowski, Michael – Cleveland, OH	Goldsmith, Perry G – Toronto, CANADA	Kisner, Frank B – Portland, OR
Brown, J. Price – Toronto, CANADA	Goldstein, Jerome – West Palm Beach, FL	Kirschner, John – New Haven, CT
Brown, Lester – Atlanta, GA	Goodale, Joseph – Ipswich, MA	Kline, Oram, P – Woodbury Heights, NJ
Bryan, Joseph H. – Washington, DC	Goodale, Robert – Ipswich, MA	Knight, Charles – Minneapolis, MN
Bryce, Douglas, P. – Toronto, CANADA	Goodyear, Henry – Cincinnati, OH	Krause, Charles, Minneapolis, MN
Butler, Ralph- Philadelphia, PA	Graham, Harrington – San Francisco, CA	Kirchner, Fernando -
Calcaterra, Thomas, Los Angeles, CA	Greene, D. Crosby Jr. – Boston, MA	Large, Secord – Cleveland, OH
Campbell, Edward H – Philadelphia, PA	Greene, Joseph – Asheville, NC	Lathrop, Frank – Pittsboro, VT
Campbell, Paul A. – San Antonio, TX	Hall, Colby – Encino, CA	LeJeune, Francis –New Orleans, LA
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