**Otolaryngology – Head & Neck Surgery Presents**

# 17th Annual Resident Research Day

October 19, 2020

University of Alberta

UNIVERSITY OF ALBERTA
FACULTY OF MEDICINE & DENTISTRY
Department of Surgery

DIVISION OF OTOLARYNGOLOGY HEAD AND NECK SURGERY

# Program at a Glance

Division of Otolaryngology – Head & Neck Surgery

## 17th Annual Resident Research Day

**October 19, 2020**

Research Day Program

07:00-07:10 Welcome and Opening Remarks

07:10-08:00 Session 1: Laryngology, Rhinology, Otology, Facial Plastics

08:10-09:30 Basic Science, Head & Neck

09:30 Closing remarks

# Resident Research Day Objectives

Upon completion of the Resident Research Day, participants will be able to:

a. List and explain the various research programs currently underway at the University of Alberta Division of Otolaryngology-Head and Neck Surgery

b. Compare and contrast various basic science and clinical research designs and their applicability to various research questions

c. Critically appraise and critique basic science and clinical research questions and designs

d. Synthesize conclusions and recommendations for clinical practice based on results from research at the University of Alberta Division of Otolaryngology-Head and Neck Surgery

e. To be able to recognize the roles and expertise of allied health professions as they pertain to the clinical and academic pursuits akin to the specialty of Otolaryngology-Head and Neck Surgery

f. To update all division members, allied services and guest specialties on current research activity of the Division of Otolaryngology-Head and Neck Surgery at the University of Alberta.

g. To generate input and enhance collaboration between all members of the Division of OHNS progressing towards clinical and academic pursuits therein.

*This activity is an Accredited Group Learning Activity (Section 1) as defined by the Maintenance of Certification program of The Royal College of Physicians and Surgeons of Canada and approved by the CSOHNS.*

# 2020 Otolaryngology – Head & Neck Surgery Resident Research Day

## Dr. Hadi Seikaly, Divisional Director University of Alberta

Dr. Hadi Seikaly is a professor of the departments of Surgery and Oncology at the University of Alberta in Edmonton. He is the Director of the division of Otolaryngology – Head and Neck Surgery and the Edmonton Zone Clinical Section Head for Alberta Health Services. Dr. Seikaly is the president of the Canadian Association of Head and Neck Surgical Oncology.

Dr. Seikaly graduated from the University of Toronto medical school and completed his residency training at the University of Alberta in Otolaryngology Head and Neck Surgery. He then obtained fellowship training at the University of Texas Medical Branch in advanced head and neck oncology, and microvascular reconstruction. Dr. Seikaly completed a Masters of the Arts in Leadership from the Royal Roads University in 2014.

Dr. Seikaly has a large practice dedicated to head, neck, and skull base oncology and reconstruction. His research interests include functional surgical and reconstructive outcomes, microvascular head and neck reconstruction, submandibular gland transfer, and digitally driven complete occlusal reconstruction. Dr. Seikaly is the director of the Head and Neck Research Network. He has been a PI or collaborator on numerous research grants receiving funding from various agencies, including CIHR, Terry Fox Foundation and Alberta Cancer Foundation. He has published over 210 peer reviewed papers and book chapters.

Dr. Seikaly is the recipient of the many prestigious awards including the Edmonton Zone Medical Staff Association researcher of the year, the Canadian Society of Otolaryngology Head and Neck Surgery award for national educational excellence, the Ernest Skakun award for service to medical education, and the Mentor of the year. He is a member of numerous surgical societies, nationally/ internationally and has been invited as a visiting professor to over 100 institutions lecturing on all aspects of Head and Neck Oncology and reconstruction.

# 2020 Otolaryngology – Head & Neck Surgery Resident Research Day

## Dr. Hamdy El-Hakim, Program Director
## University of Alberta

Dr. El-Hakim graduated from Ain Shams University in Cairo (MB, ChB 1986), Egypt. His higher surgical training was completed in the United Kingdom (CCST in Otolaryngology 2001). He is a fellow of The Royal College of Surgeons of Edinburgh (FRCSEd 1994) and obtained the Intercollegiate Board Examination in Otolaryngology (FRCS-ORL 1999).

He completed fellowship training in Pediatric Otolaryngology at The Hospital for Sick Children in Toronto from July 1999-June 2001. He has been in his current post since June 2002.

Dr. El-Hakim is the Pediatric Otolaryngology Fellowship Program Director, and the Residency Program Director for the Division of Otolaryngology Head & Neck Surgery at the University of Alberta. He is also the Lead Physician of the Aerodigestive and Aspiration Program at the Stollery Children's Hospital.

Dr. El-Hakim's research interests span pediatric and neonatal laryngology (laryngomalacia, mobility disorders), sleep disordered breathing and swallowing dysfunction.

# 2020 Otolaryngology – Head & Neck Surgery Resident Research Day

## Dr. Dan O'Connell, Research Director
## University of Alberta

Dr. Dan O'Connell is an Assistant Professor in the division of Otolaryngology – Head & Neck Surgery at the University of Alberta. He is presently the Director of the Advanced Head & Neck Oncologic and Microvascular Surgery Training Program at the University of Alberta, and is also the Director of the International Head & Neck Surgery Outreach Program as well as Undergraduate Medical Director for Otolaryngology for the Faculty of Medicine and Dentistry. Dr. O'Connell is an Associate Editor for the Journal of Otolaryngology – Head & Neck Surgery. He serves on multiple local, national and international administrative committees including Co-Chair Provincial Head and Neck Tumor Team, Secretary – Canadian Association of Head and Neck Surgical Oncology and Vice President – International Society of Maxillofacial Rehabilitation.

Dr. O'Connell completed his Bachelor of Science and Master of Science at the University of Calgary before moving to Edmonton to attend Medical School at the University of Alberta. He finished his residency in Otolaryngology – Head & Neck Surgery at the University of Alberta. He then went on to complete a fellowship in Head and Neck Oncology and Microvascular Reconstruction at the University of Washington in Seattle under Dr. Neal Futran. Dr. O'Connell returned to Edmonton in 2010 as a full time academic staff in the Department of Surgery and is active in patient care, undergraduate and post-graduate education as well as research.

Dr. O'Connell has a large practice devoted to head and neck oncology, reconstruction of complex head and neck defects, as well as thyroid and parathyroid surgery. His research interests include functional outcomes in head and neck surgery, microvascular surgery, the role of advanced monitoring in head and neck surgery and utilization of advanced digital imaging and medical modeling in head and neck surgery. Dr. O'Connell has been awarded multiple peer reviewed grants to support his research activities.

Dr. O'Connell has published over 100 peer reviewed manuscripts, book chapters and conference proceedings. Dr. O'Connell has been the recipient of the Top Ten Teachers Award and was a finalist for the Dr. William A. Shandro Award given to the Top Teacher of Surgery in the Faculty of Medicine and Dentistry at the University of Alberta.

When not working, Dr. O'Connell likes to spend time with his wife Erin and three sons, Sam, Jack and Lewis.

# 2020 Otolaryngology – Head & Neck Surgery Resident Research Day

## Dr. Shanmugappiriya (Priya) Sivarajah, PGY - 5, Resident Coordinator University of Alberta

Shanmugappiriya (Priya) Sivarajah is a fifth-year resident in the Otolaryngology-Head and Neck Surgery program at the University of Alberta. She completed her Bachelor of Science at the University of Toronto, and her medical school training at Western University, before moving to Edmonton to pursue her residency training.

She is starting her fellowship in surgical head and oncology at Mass Eye and Ear at Harvard University in July 2021. She also just completed a Master's degree in Epidemiology at Harvard University in May of 2020. Priya is the recipient of a number of research awards, including the CRINA Research Day Award, the Tom Williams Department of Surgery Research Award, the Triological Society Western Section Shirley Baron Resident Research Award (the top manuscript chosen amongst all Western section states and provinces), the Department of Otolaryngology Resident Research Day Awards, and the National Poliquin Residents Research Competition through the Canadian Society of Otolaryngology. She was also the recipient of the Champion of Care award for excellence in patient care.

Priya is currently a reviewer for BMC Cancer, a peer-reviewed journal on cancer research. She also has public health interests, and recently wrote a policy memo with recommendations that helped spur change in the current legislation in Alberta around e-cigarette products. She hopes to continue her research efforts in head and neck oncology, specifically with clinical trials, and to promote public health initiatives that raise awareness for head and neck cancer.

# Scientific Program

**Session I: Laryngology, Rhinology, Otology, Facial Plastics**
**Moderator – Dr. Vincent Biron**

07:10-07:20 **Abstract 1**
**Dr. Rachelle LeBlanc,** Megan Boonstra, Mikayla Quinlan, Andrea Seibel, Daniel Aalto, Caroline Jeffery
*Visual Biofeedback for Treatment of Paradoxical Vocal Fold Motion*

07:20-07:30 **Abstract 2**
**Dr. Connor Sommerfeld**, Justin Pyne, Adrian Mendez, David Cote
Development of a Standardized Assessment of a Patient Reported Outcomes Following Endoscopic Sinus Surgery for Chronic Rhinosinusitis

07:30-07:40 **Abstract 3**
**Zaharadeen Jimoh,** Sandra Campbell, Juliana Zenke, Agnieszka Szczepekm, Nahla Gomaa Biomarkers for Inner Ear Disorders: A non-Systemic Review of the Role of Biomarkers in Hearing and Balance Disorders

07:40-07:50 **Abstract 4**
**Damon Monroe**, Hadi Seikaly, David Cote
Patient Reported Outcomes Regarding Facial Disfigurement: Indications For Facial Allotransplantation

07:50-08:00 **Abstract 5**
**Brendan Kelly**, Justin M. Pyne, Brandon Rosvall, Andy Song, David W. J. Côté
Quantitative Evaluation of Facial Movement: Validation of the Vectra H1 Handheld System

**Session II: Basic Science/ Head & Neck**

08:10-08:20 **Abstract 6**
**Dr. Abdulrahman Alenazi**, Morris Kostiuk, Adrian Mendez, Matthew Hearn, Caroline Jeffery, Daniel O'Connell, Lakshmi Puttagunta, Jefferey R. Harris, Hadi Seikaly, Vincent L. Biron
A Novel High Risk HPV Detection Panel for the Minimally Invasive Diagnosis of Oropharyngeal Squamous Cell Carcinoma

08:20-08:30 **Abstract 7**
**Dr. Andy Song**, Ross Campbell, Jun Lin, Caroline Jeffery
Laryngoscopic and Stroboscopic Signs in the Diagnosis of Presbylaryngis

08:30-08:40 **Abstract 8**
**Dr. Brandon Rosvall,** Ashlee Matkin, Morris Kostiuk, Jordana Williams, David W. Côté, Jeffery Harris, Hadi Seikaly, Daniel O'Connell, Vincent L. Biron
Validity of Droplet Digital Polymerase Chain Reaction for TERT and BRAF Mutation Profiling of Thyroid Nodules

08:40-08:50 **Abstract 9**
**Dr. Shanmugappiriya Sivarajah,** Hadi Seikaly
Immunosuppresion Amongst Head and Neck Cancer Patients

08:50-09:00 **Abstract 10**
**Dr. Jonathan Reid**, Justin Pyne,Thomas Hudson, Rachelle LeBlanc, Vincent Biron, Daniel O'Connell, Hadi Seikaly, Veronique-Isabelle Forest, Michael Hier, Richard Payne, Jeffery Harris
Safety of outpatient thyroid surgery in Canada: A Multicentre Restrospective Corhort Study

09:00-09:10 **Abstract 11**
**Dr. Justin Pyne,** Brendan Kelly, Heather Logan, Martin Osswald, Suresh Nayar, Johan Wolfaardt, Vincent L. Biron, David Côte, Kal Ansari, Jeffrey R. Harris, Daniel A. O'Connell, Hadi Seikaly
The Accuracy and Cosmetic Outcomes of Surgical Design and Simulation in Jaw Reconstruction

09:10-09:20 **Abstract 12**
Dr. Andy Song**, Janelle Sloychuk**, Lin Fu Zhu and David W. J. Côté
Effect of platelet-rich plasma and brief electrical stimulation following facial nerve transection and neurorrhaphy in a rat model

09:20-09:30 **Abstract 13**
**Dr. Saranya Raj,** Dr. Suresh Nayer, Dr. Martin Osswald, Dr. Hadi Seikaly, Dr. Daniel Aalto
Osseointegrated dental implant survival in conventionally rehabilitated head and neck cancer patients – a retrospective study

09:30 **Closing Remarks, Dr. Dan O'Connell**

**Presenter: Dr. Rachelle LeBlanc (PGY-4)**

**Title:** Visual Biofeedback for Treatment of Paradoxical Vocal Fold Motion

**Authors:** Rachelle LeBlanc, Megan Boonstra, Mikayla Quinlan, Andrea Seibel, Daniel Aalto, and Caroline C. Jeffery

**Importance:** Paradoxical vocal fold motion (PVFM) is a common condition where the vocal cords come together instead of apart during breathing. This results in shortness of breath and occasionally significant distress. Since the condition is primarily functional, behavioural therapy and visual feedback are considered mainstays in therapy. However, prospective studies examining the efficacy of these modalities is lacking.

**Objective:** To assess the change in Dyspnea Index scores pre- and post- biofeedback therapy. To measure the change in bronchodilator and corticosteroid use pre- and 2-month post-routine biofeedback therapy.

**Methods:** This is a prospective, non-randomized clinical study. Patients were excluded if they presented in acute distress, had alternate diagnosis to explain their breathing issues, or coexisting airway or lung pathologies. Visual biofeedback was performed. Based on a minimally clinically important difference (MCID) of 8 points on the dyspnea index, a sample size of at least 20 patients is needed. Basic descriptive statistics were performed for patient demographics. A paired sample t-test and Wilcoxon signed-rank test were used to compare pre and post-measures of dyspnea index scores, and bronchodilator use.

**Results:** Twenty patients with PVFM have been enrolled in the study. The Wilcoxon signed-rank test was used to compare the difference in bronchodilator use and showed a reduction in early results ($Z = 3.29$, $p = 0.001$). The paired t-test of dyspnea index for ten patients from baseline to follow up testing showed significant improvement in symptoms. ($t(9)=4.69$, $p = 0.001$).

**Conclusions:** This is a prospective study that evaluates the potential role of visual biofeedback in managing patients with PVFM. Our early data suggests that visual biofeedback effectively reduces subjective symptoms of shortness of breath when using the dyspnea index for evaluation.

**Learning Objectives**:

1. Describe the presentation, symptoms and burden on healthcare of patients with PVFM.
2. Discuss the literature and gaps in knowledge of PVFM.
3. Outline goals and strategies for using biovisual feedback for treating PVFM.

**Presenter: Dr. Connor Sommerfeld (PGY-5)**

**Study Title:** Development of a Standardized Assessment of Patient Reported Outcomes Following Endoscopic Sinus Surgery for Chronic Rhinosinusitis

**Authors:** Connor Sommerfeld, Justin Pyne, Adrian Mendez, David Côté

**Importance:** Endoscopic sinus surgery is a minimally invasive, mucosa-preserving treatment modality for management of chronic rhinosinusitis. Clinicians report improved patient quality of life (QoL) following endoscopic sinus surgery, but few outcome measures have been developed through direct patient participation. Patient reported outcomes (PROs) are health outcome measures developed based on patient experience.

**Objective:** The objective of this study was to create a questionnaire to assess PROs following management of chronic rhinosinusitis with endoscopic sinus surgery.

**Method:** This four-phase qualitative study employed grounded theory methodology and a modified Delphi technique. In Phase I, fifteen patients were interviewed, using open-ended questioning, for identification of QoL domains impacted by chronic rhinosinusitis. In Phase II, these QoL domains were presented to a focus group of four new chronic rhinosinusitis patients, who ranked them by order of importance. A conceptual framework of QoL domains impacted by chronic rhinosinusitis was created based on patient consensus. Itemization of the PRO questionnaire was done by a focus group of five Otolaryngologists in phase III. The questionnaire was completed in Phase IV by cognitive interviewing of ten new chronic rhinosinusitis patients; ensuring ease of understanding.

**Results:** Patients identified 15 domains of QoL divided into three sub-scales: physical symptoms, psychosocial symptoms, and activity restriction. These domains provided the basis for the creation of a 19-item PRO questionnaire.

**Conclusion:** Clinical application of the novel questionnaire produced by this study will allow for an objective assessment of patient reported effectiveness of endoscopic sinus surgery for management of chronic rhinosinusitis.

**Learning Objectives:**

1. By the end of the presentation, the audience will gain an appreciation of which outcomes are considered most important by patients who have had endoscopic sinus surgery for chronic rhinosinusitis.
2. By the end of the presentation, the audience may consider integrating the presented patient-reported outcomes into their patient interviews.
3. By the end of the presentation, the audience may adopt the presented methodology to develop other patient-reported outcome measures for other patient populations.

**Presenter: Dr. Zaharadeen Jimoh**

**Title: Biomarkers for Inner Ear Disorders. A Non-Systematic Review on the role of biomarkers in hearing and balance disorders.**

**Authors:** Zaharadeen Jimoh, Sandra Campbell, Julianna Zenke, Agnieszka Szczepekm, Nahla Gomaa

**Importance:** Growing interest in inner ear biomarkers has elucidated gaps in the literature regarding a concrete definition, a classification system and an overview of their potential uses.

**Objective:** to conduct a scoping review categorizing biomarkers relevant to inner ear disorders of hearing and balance and to evaluate their possible uses.

**Methods:**
*Data Sources:* A search was conducted by a subject expert on the following databases: OVID Medline, Ovid EMBASE, EBSCO COINAHL, CA PLUS, WOS BIOSIS, WOS Core Collection, Proquest Dissertations and Theses Global, PROSPERO, Cochrane Library, and BASE. Keywords representing the concepts "biomarker" and "inner ear" were used. *Study Selection:* Two independent reviewers evaluated search results. Inclusion criteria were: peer-reviewed studies; international publications; studies examining biomarkers relevant to the inner ear, hearing or balance disorders; human studies; primary studies and literature reviews; diagnostic and interventional studies, and neurological and immunologic markers relevant to the inner ear; clinical studies, systematic reviews, meta-analyses and Cochrane reviews. Exclusion criteria were as follows: animal studies; case studies, opinion papers; non peer-reviewed studies, neurobiological and immunological markers relevant to health problems outside the inner ear diseases and genetic biomarkers. *Data extraction:* Author, year of publication, study design, biomarker, sample size (if applicable), intended use of biomarker(s), clinical application of biomarker (i.e. diagnosis or treatment), level of evidence and study limitations.

**Results:** 1502 studies were included in the initial search. Of these, 34 studies satisfied the inclusion and exclusion criteria after duplicate removal, title, and abstract screening. A total of 44 different biomarkers were identified. 3 markers were thought to contribute to a pathogenic model, 2 predicted pathology, 35 were suggested to have diagnostic capacity, 4 appear to have prognostic value and 2 may have treatment implications.

**Conclusions:** There remains debate surrounding a consensus on a concrete definition of inner ear biomarkers. While multiple biomarkers of inner ear pathology exist, many were detected in the inner ear or in temporal bone studies and not in peripheral blood. The invasive nature of obtaining samples significantly limits practical usage. Further studies are needed to elucidate the clinical significance and practical usages of biomarkers of inner ear pathology.

**Learning Objectives**:
By the end of this presentation, the learner will be able to:

1. Recognize the need for a standardized definition of inner ear biomarkers
2. Discuss a possible classification system for inner ear biomarkers
3. Recognize that the invasive nature of obtaining biomarker samples hinders clinical applications.

**Presenter: Damon Monroe (SI-4)**

**Title:** Patient Reported Outcomes Regarding Facial Disfigurement: Indications for Facial Allotransplantation

**Authors:** Damon Monroe, Hadi Seikaly, David Côté

**Importance:** Major facial disfigurement is an extremely debilitating condition, both socially and functionally. While significant advances have been made in treatment options including complex reconstructive surgeries, maxillofacial prosthetics, and even composite tissue allotransplantation, defining treatment success remains a challenge given the paucity of patient centered outcome measures.

**Objective:** To develop a Patient Reported Outcomes (PRO) assessment tool specific for patients with major disfigurement affecting the aesthetic triangle of the face.

**Design:** This is a three-phase study employing grounded theory methodology. The first Phase includes 15 individual phone interviews with eligible patients to identify the patient reported determinants of quality of life pertaining to their facial disfigurements. These are coded and sorted to build a preliminary conceptual framework. Phase Two comprised of a focus group of 5 patients presented with the conceptual framework created in Phase One and asked to rank the treatment outcomes most important to them and their quality of life. Following this, the list of prioritized outcome domains was taken to a second focus group comprised of 5 surgical experts who were tasked with creating a questionnaire based on the patient ranked outcome domains, to assess PROs following facial disfigurement. Finally, Phase Three saw the administration of the Questionnaire to 10 new patients via individually conducted interviews for content validity.

**Methods:**

- **Setting:** Tertiary otolaryngology - head and neck surgery referral center.
- **Patients:** Patients were recruited via the participating otolaryngologists' existing patient records. The criteria for significant facial disfigurement was a defect that occupies at least 1/3 of the patient's face. All defect etiologies (trauma, oncologic, surgical, congenital) were accepted.
- **Main Outcome Measures:** Primary outcomes include domains of patient reported determinants of quality of life regarding their disfigurements (e.g. function such as speech, eating, facial animation; aesthetics, scars, concealment; self-image, employment; available treatment options). The subsequent questionnaire to assess PROs following facial disfigurement will be assessed for validity by a novel group of patients.

**Results:** A novel PRO assessment tool was generated to evaluate which domains of quality of life are most pertinent to patients with severe facial disfigurement.

**Conclusions:** A validated PRO offers the provider an objective and systematic approach to treatment.

**Learning Objectives**:
By the end of this presentation the audience will be familiar with:

1. The importance of PROs in the context of severe facial disfigurement.
2. The most prominent patient reported quality of life domains affected by severe facial disfigurement.
3. The role of a validated questionnaire to assess patient reported outcomes following severe facial disfigurement.

**Presenter: Brendan Kelly (MS3)**

**Title:** Quantitative Evaluation of Facial Movement: Validation of the Vectra H1 Handheld System

**Authors:** Brendan Kelly, Justin M. Pyne, Brandon Rosvall, Andy Song, David W. J. Côté

**Importance:** Evaluation of facial function currently relies on subjective assessments resulting in suboptimal management for patients who experience facial movement disorders. Three-dimensional imaging can be used to quantitatively track facial movement which offers advantages for grading facial function as well as planning and monitoring treatment.

**Objective:** To assess the accuracy, repeatability (intra-rater reliability) and reproducibility (inter-rater reliability) of the Vectra H1 three-dimensional imaging system during imaging of four facial movements: eyebrow lift, open mouth smile, nose wrinkle, and lip pucker.

**Design:** Validation study of a potential clinical tool.

**Setting:** General community.

**Patients:** Six healthy participants with no facial movement disorders were recruited for the accuracy and repeatability portions of the study. Four additional healthy participants were recruited to be raters during the reproducibility portion of the study.

**Main Outcome Measures:** Thirteen distances between thirteen facial landmarks were measured at rest and at the endpoint of each movement by direct anthropometric measurements and Vectra Mirror 3D analysis. Correlation coefficient assessment was used to evaluate the agreeability between measures to assess Vectra H1 accuracy. Duplicate images were obtained by a single user and analyzed for each movement, and intra-class correlation coefficient assessment was used to determine repeatability. Image capture was completed by five additional raters on one healthy participant and the agreement among raters was compared by intra-class correlation coefficient assessment to determine reproducibility.

**Results:** Preliminary analysis determined correlation coefficients between Vectra Mirror 3D analysis and direct anthropometric measurements to be excellent for all distances measured among the four facial movements ranging from 0.70 (left chelion to left alae during lip pucker) to 0.99 (pogonion to left chelion during open mouth smile). Preliminary analysis of repeatability was excellent for all distances measured during the four facial movements (mean ICC = 0.98). Reproducibility was excellent for all distances and facial movements measured (mean ICC = 0.98).

**Conclusions:** The Vectra H1 met acceptable standards of accuracy, repeatability and reproducibility for clinical use. Future research will focus on developing a clinically relevant and intuitive grading scale of facial function using the Vectra H1 system.

**Learning Objectives:**

After the presentation the audience will be able to:

1. Appreciate the limitations of current subjective facial function grading tools.
2. Understand the level of accuracy, repeatability and reproducibility to expect when using the Vectra H1 to image facial movement in healthy individuals.
3. Describe how the Vectra H1 can be implemented into clinical practice to more accurately grade facial function and guide treatment.

**Presenter: Abdulrahman Alenazi (PGY-5)**

**Title:** A Novel High Risk HPV Detection Panel for the Minimally Invasive Diagnosis of Oropharyngeal Squamous Cell Carcinoma

**Authors:** Abdulrahman Alenazi, MD, Msc , Morris Kostiuk, PhD Adrian Mendez, MD, PhD, FRCSC Matthew Hearn, MD, FRCSC Caroline Jeffery, MD, MPH, FRCSC Daniel A. O'Connell, MD, MSc, FRCSC Lakshmi Puttagunta, MD Jeffrey R. Harris, MD, MHA, FRCSC Hadi Seikaly, MD, MAL, FRCSC Vincent L. Biron, MD, PhD, FRCSC

**Importance**: HPV positive tumours have unique pathologic and clinical characteristics that have implications for prognosis and treatment decisions. The gold standard for determining HPV status in OPSCC is demonstration of oncogenic HPV DNA in fresh tissue using real-time quantitative polymerase chain reaction **(RT-qPCR).** Due to the high cost and specialized equipment required for this method, most centers have adopted p16 immunohistochemistry (p16 IHC) as the preferred method of oncogenic HPV detection, which has become the clinical standard; however, this can be inaccurate in up to 15 % of cases. The accuracy of HPV-OPSCC diagnosis can be significantly improved using **droplet digital PCR (ddPCR)** utilizing oropharyngeal swabs.

**Objectives**: To validate a novel high-risk HPV detection panel using droplet digital PCR (ddPCR) for the diagnosis of oropharyngeal squamous cell carcinoma (OPSCC).

**Design:** Prospective cohort study for screening and diagnostic test at a tertiary head and neck oncology center with average specimen collection duration of 50 months.

**Methods**: Tissue specimens were collected by the diagnosing surgeon at time of initial biopsy (by needle aspirate of tumor + swab) and post-treatment (with salivary swabs). Specimens were collected over the period between Jan 2015 and March 2019. Samples were processed for ddPCR and analyzed for hrHPV-ddPCR, viral copy number, *CDKN2A* (p16 gene) and EEF2 (RNA expression control). The level on concordance between the tissue sample and swabs was measured and reported for diagnosing acuuracy.

**Results**: 130 patients with Oropharyngeal SCC were found eligible to enter the study. 65 Samples have also been enrolled as control subjects. Of the 130 obtained oropharyngeal swabs, HPV-16 strain was predominant followed by HPV- 18 (70% and 5.4% respectively) with a few swabs also tested positive for HPV-31, 33, 35, 39, 45, 58, and/or 59 which indicates 2 high-risk HPV positive strains in the same swab (10.7%). Of the 102 participants with positive HPV-p16 OPSCC by IHC, 76.9% tested positive for the disease by ddPCR utilizing oropharyngeal swabs with a sensitivity rate of 95.1% (88.93-98.39%).

**Conclusions**: The use of hrHPV-ddPCR testing may improve the diagnostic accuracy of HPV+OPSCC which is important for clinical staging and patient-centered care.

**Learning Objectives**:
Learners will be helped to:

1- Identify the transcriptionally active high-risk HPV types in OPSCC tumour tissue
2- Compare the diagnostic accuracy of hr-HPV-dd-PCR to the conventional method of P16 immunohistochemistry in diagnosing HPV positive OPSCC
3- Evaluate dd-PCR as a diagnostic tool for viral load quantification in high risk types of HPV

**Presenter:** Andy Song (PGY-3)

**Title:** Laryngoscopic and Stroboscopic Signs in the Diagnosis of Presbylaryngis

**Authors:** Andy Song, Ross Campbell, Jun Lin, Caroline Jeffery

**Importance:**
With increasing global longevity and vocational demands in elderly cohorts, presbylaryngis is becoming an increasingly common laryngeal disorder. Although voice complaints and examination findings are well described, these characteristics are non-specific, posing a challenge in delineating an accurate diagnosis.

**Objectives:**
We aimed to evaluate the ability of novice and expert otolaryngology reviewers in accurately determining patient age based on laryngeal examination alone, and in identifying signs of presbylaryngis when establishing a diagnosis.

**Design:**
Studies of Screening and Diagnostic tests

**Methods:**
We prospectively enrolled fellowship trained laryngologists as well as otolaryngology resident trainees as expert and non-expert reviewers, to interpret de-identified videolaryngoscopy clips. Reviewers were asked to stratify the age of the patient, establish a diagnosis of presbylaryngis, and specify which laryngoscopy features were identified when making a diagnosis. Kappa analysis was performed to assess inter-rater agreement.

**Results:**
Two expert and three non-expert reviewers interpreted 50 de-identified videolaryngoscopy clips of patients presenting with various laryngeal and non-laryngeal complaints. The mean age of patients was 54.9 years old with comparable male:female sex distribution at 26:24. The overall accuracy of all raters combined was only 34.8%. Kappa analysis demonstrated fair and moderate non-expert and expert inter-rater agreement on diagnosis of presbylaryngis.

**Conclusion:**
Our study illustrates the ongoing challenge in achieving clinical consensus when diagnosing presbylaryngis, attributable to the non-specific findings on presentation.

**Learning Objectives:**

1) By the end of the session the audience will be able to describe the common symptoms and demographics of presbylaryngis

2) By the end of the session the audience will be state the characteristics most commonly reported in laryngoscopic diagnosis of presbylaryngis

3) By the end of the session the audience will be able to detail some of the treatment options available for presbylaryngis

**Presenter: Dr. Brandon Rosvall (PGY-3)**

**Title:** Validity of droplet digital polymerase chain reaction for *TERT* and *BRAF* mutational profiling of thyroid nodules

**Authors:** Brandon R. Rosvall, Ashlee Matkin, Morris Kostiuk, Jordana Williams, David W. Cote, Jeffrey Harris, Hadi Seikaly, Daniel A. O'Connell, Vincent L. Biron

**Importance:** Mutations involving BRAF and TERT are important predictors of disease severity in thyroid cancer, but pre-operative molecular testing is limited by cost and lack of adequate tissue sample. Droplet digital PCR (ddPCR) is an ultrasensitive method of detecting gene targets, with advantages over other molecular techniques in specimen containing low amounts of nucleic acid.

**Objective:** This study aimed to assess the utility of BRAFV600E and TERT ddPCR testing as a diagnostic adjunct for thyroid fine needle aspirate biopsy (FNAB).

**Methods:**
**- Subjects.** Patients with thyroid nodules meeting indication for FNAB were prospectively enrolled from March 2015 to September 2018.
**- Interventions.** Pre-operative FNAB was collected for standard cytology and molecular testing. BRAFV600E and TERT levels were analyzed by ddPCR. Cytology (Bethesda system) and ddPCR results were correlated to final surgical pathology.

**Results:** A total of 210 patients were prospectively enrolled, of which 112 received thyroid surgery. Pre-operative cytology alone with Bethesda ≥5 was 100% specific and 65.5% sensitive for malignancy on final surgical pathology. FNAB ddPCR results showing BRAFV600E or TERT positivity was 100% specific and 60.7% sensitive. Combining cytology (Bethesda ≥5) with BRAFV600E and TERT testing increased the sensitivity of a malignant diagnosis to 75.9%. High TERT levels or dual positivity for TERT and BRAFV600E was associated with aggressive or advanced stage pathology.

**Conclusions:** Combining cytology with ddPCR analysis of BRAFV600E and TERT can improve the diagnostic accuracy of thyroid FNABs.

**Learning Objectives**:
By the end of this presentation, the learner will:
1. understand the utility of molecular testing in thyroid cancer.
2. appreciate the benefits of droplet digital PCR over traditional PCR.
3. appreciate the utility of BRAFV600E and TERT in improving the diagnostic accuracy of thyroid fine needle aspirate biopsy.

**Presenter: Dr. Priya Sivarajah (PGY-5)**

**Title:** Immunosuppression amongs Head and Neck cancer patients.

**Authors**: Shanmugappiriya Sivarajah, Hadi Seikaly

**Importance**: Immunosuppressive medications are the foundation to managing several chronic inflammatory, autoimmune, and neoplastic conditions. The current treatment paradigms recommend a more aggressive approach to suppressing these patients, to achieve disease remission.

**Objective**: This study was undertaken to determine whether past or present treatment with immunosuppressants is associated with poorer survival outcomes in patients with oral cavity and oropharyngeal squamous cell carcinomas (SCCs).

**Design**: Retrospective cohort study.

**Methods**: This is an ongoing comprised of adult patients who underwent treatment with curative intent in Alberta for oral cavity or oropharyngeal SCCs, between 2006 and 2018. Patient factors including a history of immunosuppression and post-treatment survival outcomes were collected.

**Results:** Of the 118 patients, 25 (21.2%) were immunosuppressed. While controlling for age, gender, smoking status and treatment modality, the odds of dying in patients with oropharyngeal cancer (n=66) was 5.09 times more likely in patients who were immunosuppressed than in those who were immunocompetent (p=0.03). Similarly, the hazard of death in oropharyngeal cancer patients who were immunosuppressed was 2.93 times that of those who were immunocompetent (p=0.01). This effect was not observed for oral cavity cancer patients. Stratifying by immunosuppression and HPV status, the Kaplan Meier survival curve for overall survival suggests that those who are immunosuppressed with HPV have worse survival outcomes than those who are HPV-negative.

**Conclusions**: Immunosuppressive medications may significantly increase the risk of mortality in those who are HPV-positive. This bears implications for routine HPV vaccination, treatment de-escalation, immunotherapy, and is a public health message for general practitioners and rheumatologists.

**Learning Objectives**

1. To illustrate the importance of recognizing a history of immunosuppression in patients with head and neck cancer, specifically in oropharyngeal cancer
2. To compare and contrast treatment and survival outcomes of immunosuppressed patients to immunocompetent patients
3. To recognize the importance of identifying HPV status, and the implications it has on vaccinating vulnerable cohorts, treatment de-escalation, it's possible impact on immunotherapy, and its value as a public health message for physicians and allied health

**Presenter: Dr. Jonathan Reid (PGY-2)**

**Title:** Safety of Outpatient Thyroid Surgery in Canada: A Multicenter Retrospective Study

**Authors:** Jonathan Reid, Justin Pyne, Thomas Hudson, Rachelle LeBlanc, Vincent Biron, Daniel O'Connell, Hadi Seikaly, Veronique-Isabelle Forest, Michael Hier, Richard J. Payne, Jeffrey Harris

**Importance:** Thyroid surgery has historically been performed on an inpatient basis to mitigate the risk of airway compromise from postoperative hemorrhage or recurrent laryngeal nerve (RLN) injury. However, inpatient stay is costly and exposes patients to additional risks. Outpatient thyroid surgery has been shown in the United States to be safe, but Canadian data is lacking.

**Objective:** To determine the rates of readmission, reoperation and complications in outpatient thyroid surgery in Canada.

**Design:** Retrospective case series.

**Setting:** Tertiary head and neck cancer referral centers in Edmonton and Montreal.

**Patients and Methods:** Patients undergoing at least hemi-thyroidectomy between 2011 and 2019 were identified by retrospective review of 5 high-volume thyroid surgeons' lists at tertiary centers in Edmonton and Montreal. Data was collected retrospectively from health records. Patients selected for outpatient thyroid surgery based on institutional guidelines were included. Those scheduled for an inpatient procedure were excluded. Descriptive statistical analysis was performed using SPSS.

**Main Outcome Measures:** Primary (rate of readmission) and secondary outcomes (rates of reoperation, emergency room visits within 30 days, and complications) were collected.

**Results:** The records of 444 patients at tertiary centers in Edmonton and Montreal were searched. Sixty-seven patients were scheduled for day surgery based on institutional criteria, but one (1.5%) was admitted before discharge. No patients required readmission or reoperation following hospital discharge. Seven patients had an emergency room visit within 30 days (10.4%), 3 of which (43%) were unrelated to the surgery. Only two patients (3.0%) had post-operative complications, one with RLN injury (1.5%) and one with hematoma that was managed conservatively (1.5%).

**Conclusions:** With low rates of readmission, reoperation and complications, the results from this large multicenter cohort suggest that outpatient thyroid surgery in Canada is safe among high-volume thyroid surgeons in patients who meet institutional criteria.

**Learning Objectives**:

By the end of this presentation the audience will be familiar with:
1. The rates of common complications of thyroid surgery.
2. Examples of criteria used to select candidates for safe outpatient thyroid surgery.
3. The safety of outpatient thyroid surgery in Canada compared to that of other nations.

**Presenter: Dr. Justin Pyne (PGY-3)**

***Title:*** **The Accuracy and Cosmetic Outcomes of Surgical Design and Simulation in Jaw Reconstruction**

***Authors:*** Justin M. Pyne, Brendan Kelly, Heather Logan, Martin Osswald, Suresh Nayar, Johan Wolfaardt, Vincent L. Biron, David Côte, Kal Ansari, Jeffrey R. Harris, Daniel A. O'Connell, Hadi Seikaly

***Importance:*** The advent of free tissue transfer containing vascularized bone has significantly improved the patients' outcomes after jaw reconstruction. The ultimate goal of functional jaw reconstruction is the reconstruction of the dental occlusion and oral rehabilitation, but this goal is dependent in the accuracy of the reconstruction bone placement and 3D orientation at the time of reconstruction. Surgical design and simulation (SDS), also known as virtual surgical planning, is a recently developed technological adjunct that assists the reconstructive surgeons in achieving accurate jaw reconstructions and can potentially enhance the overall patients' quality of life in survivorship.

***Objective:*** The purpose of this study was to examine the accuracy of the surgical design and simulation in a cohort of patients undergoing jaw reconstructions.

***Design:*** *Prospective cohort study*

***Setting:*** *Tertiary Head and Neck Cancer Center*

***Methods:***

- ***Data Sources.*** *Head and Neck Cancer Reconstructive Database and the Institute for Reconstructive Sciences in Medicine.*
- ***Study Selection.*** *Inclusion criteria included* any patient that had undergone jaw reconstruction with SDS between 2010 and 2015. The primary outcome of this study was the accuracy of the postoperative implant positions as compared to the SDS plan.
- ***Data Extraction.*** *Reviewers at our institution analyzed charts and CT scans, and stored this information in a database. Data was then extracted from this database and used to compute the accuracy of each implant placement*

***Results or Data Synthesis****:* 23 patients with 80 implants were included in the study. All flaps survived there was no implant loss postoperatively. The mean center-point distance between the actual and planned implant position were 1.5 mm (SD ± 1.2 mm) in the X-axis, 2.0 mm (SD ± 1.0 mm) in the Y-axis, and 1.8 mm (SD ± 1.1 mm) in the Z-axis.

***Conclusions:*** SDS in Jaw reconstruction results in a highly accurate reconstruction with less than 2 mm accuracy of osseointegrated implants. SDS is an excellent tool in the reconstructive surgeon's armamentarium that can potentially improve the patient's functional outcomes.

**Learning Objectives**:
By the end of this presentation the audience will be able to:

1. Apply the concept of surgical design and simulation for use in jaw reconstruction
2. Describe the importance of absolute accuracy for each dental implant placed during surgery to be successful.
3. Appreciate the potential for good aesthetic outcomes for patients undergoing jaw reconstruction with immediate implants for benign and malignant disease.

***Presenter:*** **Janelle Sloychuk (SI-3)**

**Title**: Effect of platelet-rich plasma and brief electrical stimulation following facial nerve transection and neurorrhaphy in a rat model

**Authors**: Andy Song, Janelle Sloychuk, Lin Fu Zhu and David W. J. Côté

**Objective**: Recent studies have reported promising effects of platelet-rich plasma (PRP) on nerve regeneration. In prior studies using the rat model, brief electrical stimulation (BES) has accelerated whisker movement recovery compared to a control group. The objective of this research is to assess the combined effect of BES and PRP on accelerating facial nerve functional recovery from a transection injury in the rat model.

**Design**: Prospective randomized animal study.

**Methods**: Two groups of 6 rats underwent facial nerve transection and repair at the main trunk of the nerve. Both groups received BES on post-operative day 0 for 1 hour using an implantable stimulation device, with group 2 additionally receiving PRP. Primary outcome was measured using a laser curtain model, which measured amplitude of whisking at 2-week intervals from 2-12 weeks post-operatively.

**Main Outcome Measures**: Difference in facial nerve functional outcomes between rats receiving BES (Group 1) versus BES plus PRP (Group 2) post-operatively.

**Results**: At week 2, the average amplitude observed for group 1 was 2.0°. Showing a statistically significant improvement over group 1, the group 2 mean was 6.5° at 2 weeks post-operatively ($p=0.0006$). At week 4, group 2 showed improvement having an average of 10.1°, while group 1 remained relatively unchanged with an average of 6.1°. Group 2 had an average of 14.0° at 6 weeks from surgery while group 1 had a marginal increase in amplitude with an average of 8.2°. At week 8, group 2 showed further improvement with an average amplitude of 16.7°. Group 1 had an average of 9.8° at week 8. There was no significant difference between the two groups in weeks 10 and 12.

**Conclusions**: Results suggest that BES following facial nerve transection and neurorrhaphy is associated with accelerated whisker movement in a rat model immediately post-operatively, however BES paired with PRP results in accelerated facial nerve recovery in weeks 4 to 8.

**Learning Objectives**:
By the end of this presentation the audience will:

1. Become familiar with the literature surrounding the utility of post-operative BES and PRP in facial nerve regeneration
2. Understand the proposed mechanism of axonal regeneration by post-operative BES
3. Become familiar with the efficacy of BES and BES plus PRP on facial nerve functional outcomes in the rat model

**Osseointegrated Dental Implant Survival in Conventionally Rehabilitated Head and Neck Cancer Patients - A Retrospective Study**

**Rajan S, Nayar S, Osswald M, Seikaly H, Aalto D**

Keywords: dental implant, implant survival, head and neck cancer

**Purpose:**

The aim of the retrospective outcome analysis is to evaluate the survival rate of osseointegrated intraoral dental implants in conventionally rehabilitated head and neck cancer patients at Institute of Reconstructive Sciences in Medicine.

**Methods and Materials:**

All the patients to be reviewed if they fulfilled the inclusion criteria which includes head and neck cancer patients who were rehabilitated with dental implants from 1990 till 2020. A patient who underwent surgical resection with bony reconstruction, extraoral implants/ craniofacial implants and who was under the age of 18 years was excluded from the study. 30 years of data was collected for this study.

**Result**

- The study included 166 head and neck cancer patients who were rehabilitated with 1311 dental implants. During the span of 10 year analysis, the total number of deceased patients was 53 and total number of dental implants failed was 39. Kaplan Meier Analysis curve was used for statistical analysis and it showed the overall implant failure in the patient cohort. The curve clearly highlights that the mean follow up time was 4.6 years.

- The implant survival rate at 1, 3, 5 & 10 years with corresponding confidence interval has been discussed below:

  - ✓ In 1st follow up year, 1311 number of implants were reviewed, of which 12 implants were found to be failed. The survival rate in the first year follow up was found to be 99%.

  - ✓ In 3rd and 5th follow up year, there was a similar survival rate of 98%.

  - ✓ In 10th follow up year, 301 implants were reviewed of which additional 17 implants had failed. The survival rate was found to be 94%.

**Conclusion**

To conclude, we observed 94% ten-year survival rate in head and neck cancer patients rehabilitated with osseointegrated dental implants. The influence of covariates which include gender, medical history, radiotherapy, chemotherapy and hyperbaric oxygen therapy did not show any significant influence on implant survival when investigated using Cox proportional hazard analysis.

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