



Canadian Society of Otolaryngology-Head and Neck Surgery

2012 POLIQUIN RESIDENTS COMPETITION – 66<sup>TH</sup> ANNUAL MEETING, TORONTO, ON

***Medial Mandibulotomies: Is There Sufficient Space in the Midline to Allow a Mandibulotomy Without Compromising the Dentition? – T. Shinghal, University of Toronto***

E. Bissada, D. Brown, R. Gilbert, P. Gullane, J.N. Irish, R. E. Wood, D. Goldstein

**Objectives:** The objective of this study is to determine the frequency of complications in median and paramedian mandibulotomies. In addition, we calculated the space in the median and paramedian region. **Methods:** A retrospective chart review was performed for all cases of mandibulotomy from 2002 to 2010. 118 (62 paramedian & 56 median) charts were identified. We included data on complications, which fell in the following 3 categories: dental, mandibular and plate complications. For our second objective, we evaluated 40 patients with base of tongue or tonsillar cancer treated with intensity modulated radiation therapy (IMRT). The interdental space was electronically calculated on the digital Panorex between the central incisors and the lateral incisors and canines. **Results:** The patient characteristics were similar and not significantly different. The mandibular complications were comparable. The paramedian group had significantly more plate complications ( $p=0.0285$ ). The median group had significantly more dental complications ( $0.0316$ ). The distance between the central incisors was significantly less than the distance between the lateral incisors and canines both at the crestal and apical levels ( $p=0.0086$  and  $p<0.001$ ). **Conclusions:** There are significantly more dental complications in the median approach. In addition, there is significantly less space in the median area. This is the first study that documents the advantage of the paramedian approach for dental complications.

***Can Otoplasty Impact hearing? A Prospective Randomized Controlled Trial Examining the Effects of Pinna Position on Speech Reception and Intelligibility – M. McNeil, Dalhousie University***

S. Aiken, M. Bance, P. Hong

**Objectives:** Otoplasty is a commonly performed surgical procedure that restores the ideal position of the pinna. Although the pinna is a well-recognized component of the auditory apparatus, no studies have assessed the audiological effects of this procedure. We sought to quantify the impact of pinna repositioning on speech intelligibility and reception. **Methods:** Eighteen adults with normal hearing and pinnae were recruited and the pinna positions were randomized in each participant. Intracanal acoustical analysis was performed to calculate the Speech Intelligibility Index (SII). Hearing In Noise Test (HINT) with two azimuth speaker arrangement was also performed. The outcome measures were compared using paired t-tests for both pinna positions. **Results:** The SII significantly improved with the pinna in forward position (49.3 vs. 45.8,  $p<0.001$ ). HINT thresholds also improved with the pinna forward (-6.43dB vs. -5.08dB,  $p=0.0003$ ). **Conclusions:** Pinna position affects audiological performance, in both speech intelligibility and speech reception in noise. These are novel findings that may impact the informed consent process and decision to treat for patients undergoing otoplasty.

***The High Performance Physician Program: The Impact of Performance Psychology in an Otolaryngology Program – A.***

**Darnbrough, University of Manitoba**

G. Osler

Objectives: To implement and evaluate the efficacy of a High Performance Physician Program (HPP) in an otolaryngology program. Design: The HPP involves individual assessment, reading, seminars, group discussion, & individual counseling. (curriculum attached). The program was administered by two performance psychologists who have worked with various Olympic and professional athletes and medical professionals. The HPP consists of 4 sessions in a 4-month period. It was administered separately for residents (n=11) and staff (n=16). Methods: Both qualitative and quantitative research methods were employed. Main Outcome Measures: Qualitative outcome measures include participant testimonials. Quantitative measures include 3 validated surveys delivered before and after the HPP program: Maslach Burnout Inventory, Brief Resident Wellness Profile, and Stanford Presenteeism Scale: Health Status & Employee Productivity. Results: We hope to support the hypothesis that incorporating performance psychology in the academic curriculum will lead to enhanced productivity, team dynamics and surgical performance and decreased rates of burnout.

***Propranolol as a Novel Adjunctive Treatment for Head and Neck Squamous Cell Carcinoma – N. Wolter, University of Toronto***

J. Wolter, D. Enepekides, M. Irwin

Objectives: To investigate Propranolol as a novel treatment for oral squamous cell carcinoma (OSCC) in vitro. Methods: OSCC cell lines were cultured and treated with Propranolol alone and in combination with Cisplatin. Alamar blue assays were performed to assess cell viability and apoptosis was confirmed via western immunoblot for cleaved PARP and caspase-3/7 assays. Results: Propranolol reduced cell viability and induced apoptosis. In response to propranolol  $\Delta$ Np63 $\alpha$  decreased, whereas Tap73 $\beta$  and downstream pro-apoptotic p53-family target genes increased. Expression of the pro-angiogenic protein VEGF also decreased. Combination treatment with Propranolol and Cisplatin resulted in synergistic effects. Conclusions: Our results demonstrate that Propranolol reduced OSCC viability, induced apoptosis, and inhibited production of the pro-angiogenic protein VEGF. These changes may be due to modulation of p53 family proteins, which are critical regulators of chemotherapy-induced apoptosis in OSCC. Moreover, propranolol is synergistic in combination with Cisplatin, which may have important implications for patient care.

***Cyclin D1 Overexpression is Associated with Poor Prognosis in Oropharyngeal Cancers in British Columbia - A Tissue Microarray Study - Lin, R. J., University of British Columbia***

T. Lubpairee, Y.P. Liu, D. Anderson, S. Durham, C. Poh

Objectives: To determine the biological characteristics of oropharyngeal squamous cell carcinoma (OpSCC) and its outcome. Methods: Patients (N=66) with primary OpSCC with known outcome from 2000 to 2005 were retrospectively identified from Pathology database and chart review. Among these, 45 biopsy samples with enough tissue were retrieved to construct a tissue microarray for analysis, including high-risk Human Papillomavirus (HPV) using Chromogenic in situ hybridization (CISH) and expression of p16, mib-1, EGFR, p-EGFR, and cyclinD1 using immunohistochemistry. Results: Among 66 patients, 39 (59%) patients have no recurrence or die without disease (Group 1) at last follow-up and 27 patients have persistent disease or die of disease (Group 2). Although there is more than twice longer follow-up time of Group 1 ( $57\pm 27$  vs.  $22\pm 19$  months;  $P < 0.0001$ ), there is no difference in age, gender, smoking/alcohol habits, presence of HPV (by CISH or p16), and TNM staging between groups. Among those 45 cases with tissue,

there is no difference in all the markers tested between outcome groups; however, cyclinD1 overexpression is highly associated with poor prognosis when comparing time to outcome (P=0.014). Conclusion: CyclinD1 expression is a potential prognostic marker of OpSCC.

***The New Age of Play Audiometry: Validation Testing of an iPad-based Play Audiometer*** – J. Yeung, University of Ottawa

H. Javidnia, S. Heley, Y. Beaugard, L. Moran, M. Bromwich

Objective: Timely diagnosis of hearing loss in the pediatric population has significant implications for a child's development. However, audiological evaluation in this population poses several unique challenges. The objective of this study was to validate a new iOS-based play audiometer which overcomes some of these challenges. Methods: A patient centered and interactive iPad play audiometer was specifically developed to test pure tone thresholds in young children. This game-like tool was directly compared to standard play audiometry in 80 consecutive patients aged 3-5. Results: When compared to standard play audiometry, the averaged (n=80) absolute error using iPad audiometry was equivalent within accepted test re-test variability (<5dB). Both frequency specific analysis and the complete audiogram were equivalent between the two methods. No significant difference between the test methods was reported. Conclusion: The novel iPad based play audiometer is an efficient, rapid and clinically accurate method of evaluating hearing in young children.

***Laser Doppler Vibrometry Measurements of Human Cadaveric Tympanic Membrane Vibration*** – J. Beyea, University of Western Ontario

H. Ladak, S. Alireza Rohani, S. Agrawal

Background: Laser Doppler vibrometry (LDV) is a non-contact optical technique which can be used to measure tympanic membrane vibration. Attempts have been made to use vibrations measured at the eardrum to differentiate between ossicular defects such as malleus fixation, stapes fixation and incus disarticulation behind an intact eardrum to mitigate the need for exploratory surgery. Objectives: To determine the feasibility of measuring vibrations at multiple locations on the eardrum to differentiate normal eardrums from those with simulated ossicular pathologies. Methods: LDV measurements are taken from multiple locations on tympanic membranes of cadaveric heads with intact ossicles (normals). These same measurements are taken after the stapes footplate has been fixed, the incudo-stapedial joint has been separated, and the malleus head has been fixed. Results/Conclusions: Measurements made at multiple locations may provide information regarding various ossicular pathologies, but obtaining measurements is challenging.

***Corticosteroid Uptake in Auditory Hair Cells via Transtympanic versus Systemic Administration*** – Grewal, A., University of Toronto

J. Nedzelski, J. Chen, V. Lin

Objective: To investigate corticosteroid uptake in auditory hair cells following transtympanic versus systemic administration of dexamethasone. Methods: Swiss-Webster mice were injected with dexamethasone via transtympanic or systemic administration. At 1-, 6- or 12- hours post-injection the temporal bones were harvested. After cryosectioning, immunohistochemical staining was performed using an antibody for dexamethasone. Results: Strength of dexamethasone labelling was greatest at 1-hour. Transtympanic injection resulted in moderate dexamethasone labelling of the inner hair cells, and a decreasing basal-to-apical gradient was observed. Similar

labelling strength and gradient was seen after 10mg/kg systemic injection. Very strong uptake in all regions was noted after a 100mg/kg dexamethasone injection, with no appreciable gradient. Significant loss of labelling was seen at 6- and 12-hour intervals in all groups. Conclusions: Corticosteroid uptake is maximal in the auditory hair cells after 1-hour. Transtympanic administration appears equivalent to high-dose systemic dexamethasone. Corticosteroid labelling in hair cells diminishes rapidly after 1-hour.

***Surgical vs Ultrasound-guided Drainage of Deep Neck Space Abscesses: A Randomized Controlled Trial – V. Biron, University of Alberta***

G. Kurien, P. Dziegielewski, B. Barber, H. Seikaly

Objectives: To determine the safety and cost-effectiveness between surgical and ultrasound-guided (US) drainage of deep neck space abscesses. Design: Randomized controlled trial (RCT). Methods: Patients presenting to the University of Alberta Emergency Department with a well-defined deep neck space abscess were recruited in the study. Patients randomized to surgical or US-guided drainage, placed on intravenous antibiotics and admitted. Following drainage with either intervention drains were left in place until discharge. Results: Patients treated by US-guided and surgical drainage had a mean post-operative hospital stay of 3 days and 5.5 days respectively ( $p>0.05$ ). There were no significant differences between groups in terms of demographics, abscess volume, recurrence or follow-up. A cost analysis calculated a \$10,236.85 reduction per patient when treated by US-guided vs surgical drainage. Conclusions: Ultrasound-guided drainage is safe, results in shorter hospital stay and improved cost-effectiveness in comparison to surgical drainage. Significance: First RCT demonstrating efficacy of US-guided drainage of neck abscesses.

***HPV Status and Second Primary Tumours in Oropharyngeal Squamous Cell Carcinoma: Implications for Diagnostic Work-up – C. Xu, University of Alberta***

V. Biron, H. Seikaly

Background: Human papilloma virus has changed the management, treatment and outcomes of oropharyngeal cancer. Objective: To determine the rate of secondary primary tumour (SPT) in HPV-positive and HPV-negative patients diagnosed with oropharyngeal squamous cell carcinoma (OPSCC) and to determine the diagnostic yield of panendoscopy and full body PET/CT in detecting lesions. Methods: Retrospective review of 410 patients diagnosed with OPSCC in Alberta. Second primary tumours were identified. HPV-status of tumours was determined by immunohistochemistry staining for p16. Results: Thirty-eight % of patients were HPV-positive and 31% were non-smokers. The overall rate of SPT's was 8.3% (34/410) with a rate of 2.6% in HPV-positive patients and 10.9% in HPV-negative ( $p=0.006$ ). Smoking and HPV-negative status were associated with an odds ratio of 21.5 (95% CI: 2.9 – 159.2) and 6.45 (95% CI: 1.93 – 21.4) respectively for presence of SPT's. Overall yield of SPT's by panendoscopy and PET-CT was 4.1% and 5.2%, respectively. In HPV-positive patients, the yield for SPT's was only 4% on PET-CT and 0% on panendoscopy. Conclusions: The rate of second primary tumours in HPV-positive is significantly lower than that for HPV-negative patients. The yield of panendoscopy for SPT's in HPV-positive, non-smokers is negligible. Significance: HPV-positive OPSCCs are not subject to the same field cancerization effect as other head and neck squamous cell carcinomas.

***Survival Outcomes of Patients with Oral Cavity Squamous Cell Carcinoma Treated with Multimodal Therapy: A Multi-Institutional Analysis*** – H. Zhang, University of Alberta

V. Biron, P. Dziegielewski, K. Al-Qahtani, D. O'Connell, J. Harris, H. Seikaly

**Background:** Many institutions have added chemotherapy to the treatment protocols of advanced oral cavity squamous cell carcinoma (OCSCC) based on the results of two randomized controlled trials that were not site specific for oral cavity. **Objective:** To evaluate survival outcomes trials of advanced OCSCC patients that are treated with triple modality therapy. **Design:** Prospective population-based multi-institutional review. **Methods:** Demographic, pathologic, treatment and survival data was obtained from patients diagnosed with OCSCC within a recent 10 year span in Alberta. A total of 893 patients of overall and disease-specific survival were calculated using Kaplan-Meier and Cox regression analyses. **Results:** Patients receiving triple modality treatment had improved overall and disease specific survival when compared to other classical treatment modalities. Two and five year estimated of disease specific survival for advanced stage OCSCC was 72 and 52 respectively. **Significance:** The first prospective population based study confirming that survival of advanced OCSCC is improved with triple modality treatment.

***Predictive Factors for Morbidity and Mortality of Patients Undergoing Free Flap Reconstruction*** – R. Murphy, University of Alberta

D. O'Connell, H. Seikaly,

**Background:** The surgical treatment of advanced head and neck cancer for curative intent involves extensive operative management with significant perioperative risk. No previous description exists in the literature of a predictive stratification system unique to patients undergoing extensive head and neck resection. **Objective:** To create a method based on predictive factors from post-operative intensive care unit admission scores for mortality and morbidity based on APACHE 11, the POSSUM and patient factors such as tumor stage, length of surgery and co-morbidities. **Methods:** Four hundred patients undergoing head and neck cancer surgery were evaluated using the APACHE 11 and POSSUM. Primary measure was mortality in thirty days. Secondary measures included free flap compromise, wound infections, need for further operations and return to the intensive care unit. Multivariate analysis was used to determine the predictive value of the ICU admission scores along with salient patient factors. **Results:** APACHE 11, POSSUM, index score, length of operative time and postoperative hemoglobin constituted independent risk factors for perioperative complications in multivariate analysis. **Conclusions:** The stratification of patients based on ICU admission scores serves as an objective method to can be used to stratify patients assessed to be high risk for complications. This knowledge creates avenues for prospective studies to examine the utility of this stratification system.

***Serum Biomarkers of Papillary Thyroid Cancer*** – F. Makki, Dalhousie University

D. Pinto, A. Shahnavaz, A. Steevensz, J. Melanson, S. Douglas, J. Gallant, J. Trites, E. Teh, M. Taylor, M. Bullock, R. Hart

**Objectives:** To identify serum biomarkers of papillary thyroid cancer. **Methods:** Prospective analysis of 101 tumor and serum banked patients with thyroid masses. ELISA was employed to measure levels of five serum proteins previously demonstrated to be up-regulated in papillary thyroid cancer (PTC): angiopoietin-1 (Ang-1), cytokeratin 19 (CK-19), tissue inhibitor of metalloproteinase-1 (TIMP-1), chitinase 3 like-1 (YKL-40), and galectin-3 (GAL-3). Serum levels were compared between patients with papillary thyroid cancer (PTC) and those with benign tumors. **Results:** Total of 101 patients were enrolled in the study (28 men, 73 women), with a

median age of 54 years. Forty-three patients had papillary thyroid cancer and 58 cases were benign tumors. There were no statistically significant differences when comparing all five different biomarkers between PTC and other benign thyroid tumors. The p-values were 0.94, 0.48, 0.72, 0.48 and 0.90 for YKL-40, Gal-3, CK19, TIMP-1, and Ang-1, respectively. Conclusion: ELISA data did not show a significant difference in biomarkers. Although some of the markers (Gal-3 & TIMP-1) displayed a greater potential difference which may warrant further investigation, this study indicates that other markers should be sought.

### ***Nerve Sparing Surgery Assisted by Intra-Vital Application of Leucomethylene Blue – N. Sands, McGill University***

N. Sands, L. HP Nguyen, M. Husein, E. Cooper

Objectives: An old technique for nerve-staining involves the application of leucomethylene blue (LMB), a reduced and colorless derivative of methylene blue, which is preferentially oxidized and restored to its native blue color by oxygenated nerve tissue. Despite numerous descriptions, nerve staining with LMB is lacking reliable methodology and surgical applicability. Furthermore, it has only been used for staining of minute, terminal nerve branches to date. To overcome these limitations, we performed a study in the rodent model using the sciatic/tibial nerve. Methods: We sought to determine the ideal composition of LMB at multiple levels: 1) In a closed flask exposed to pure oxygen 2) In-vitro using isolated neuronal cells 3) In-vitro using whole nerve segments 4) In vivo staining of exposed and unexposed segments of nerve to facilitate isolation and dissection. Results: Our preliminary work has identified that the ideal composition of LMB in vitro is [0.36] ascorbic acid and [0.00012] of MB applied at a PH of 5-5.5. We achieved profuse blue staining of neuronal cells and whole-nerve segments within 5 minutes following application. In vivo staining has been achieved and is undergoing further refinement. Formal measures (cell counts, nerve conduction studies, histopathology) will follow. Conclusion: We have optimized the stain-counterstain properties of LMB in vitro and continue to make progress in improving its surgical relevance by pursuing in-vivo experimentation.

### ***The Effect of NSAIDs on Abscess Formation Using a Standardized Murine Model – E. Arruda, University of Toronto***

V. Forte, P. Campisi, E. Monteiro, R. Chami, G. Taylor, S. Richardson

Abscess formation is a complex host response that involves fibrin deposition which forms a capsule, localizing invading microorganisms to protect the host from disseminated infection. However, microorganisms sequestered within this fibrous capsule are themselves protected from normal host clearance mechanisms thereby permitting unopposed proliferation. The overall objective of this study was to determine whether treatment with non-steroidal anti-inflammatories (NSAIDs) affects the immune system's ability to loculate/wall off an infection through abscess formation. We developed a murine model of abscess formation using subcutaneously injected *Fusobacterium necrophorum*. After this, injected mice were treated with a variety of antipyretic medication to test their modulation of abscess formation. We examined the abscesses histologically as well as radiologically to gain some understanding as to the mechanism, if any, of how NSAIDs affect the process of abscess development. We have found that mice given high doses of acetaminophen, ibuprofen and meloxicam have an average abscess size of 2.5, 2.7 and 2.3 mm compared to controls (3.2 mm). Histologically, the acetaminophen, ibuprofen and meloxicam group showed decrease rates of fibrin rim foundation (29%, 38% and 18%) compared to control mice (89%). We are currently investigating the clinical significance of these differences and correlating them with radiological findings. No mice suffered from sepsis or disseminated infection.

## ***CD8a Gene Polymorphisms Predict Severe Chronic Rhinosinusitis*** – S. Alromaih, McGill University

L. Mfuna-Endam, Y. Bosse, A. Alfilali-Mouhim, M. Desrosiers

Introduction: A genetic basis to chronic rhinosinusitis (CRS) is postulated, but remains elusive. We have recently identified low levels of circulating CD8 lymphocytes as a frequent finding in severe, refractory CRS. Low circulating levels of CD8 lymphocytes secondary to mutations in the CD8a and Tapasin (TAPBP) genes lead to MHC-1 deficiency which is associated with severe CRS. Objectives: We wish to identify genetic factors associated with MHC1 deficiency in CRS. Methods: Previous results from a genome-wide association study of chronic rhinosinusitis (Bosse, 2009) were screened for polymorphisms in the CD8a and TAPBP genes. Significant polymorphisms were screened for associations with demographic factors characterizing severe sinusitis. Results: The CD8a SNP rs3810831 and TAPBP SNP rs2282851 were significantly associated with CRS. Homozygosity for rs3810831 (CD8a) was associated with a higher frequency of affected relatives, increased severity as characterized by age at diagnosis, age at 1st surgery, and number of surgeries, while rs2282851 (TAPBP) was associated with mild disease (OR= 2.48, p= 0.007613). Conclusion: Modified CD8a or TAPBP gene function may contribute to the development of refractory CRS via altered MHC-1 function and reduction of circulating CD8 lymphocytes. Identification of markers in the CD8 or TAPBP genes via sequencing may offer a basis for genetic testing in CRS.