Western

Schulich
MEDICINE & DENTISTRY

# Department of Otolaryngology

*Thirty-Second Annual*

## RESIDENTS' RESEARCH DAY

**Friday, April 28, 2006**
**The London Hunt and Country Club**

# RESIDENTS' RESEARCH DAY PROGRAM
# 2006

9:30 – 9:45 **WELCOME** Drs. Lampe/Yoo

## CHAIRMAN – DR. HOWARD LAMPE

| | | |
|---|---|---|
| 9:45 – 9:55 | **Mr. Luke Harris** | Preoperative Localization of Parathyroid Adenomas using SPECT/CT Hybrid Imaging: Preliminary Results |
| 9:55 – 10:00 | **Interactive Discussion** | |
| 10:00 – 10:10 | **Mr. Robert Leeper** | Differential Profiles of Voice-Related Quality of Life in Patients With and Without Benign Vocal Fold Lesions |
| 10:10 – 10:15 | **Interactive Discussion** | |
| 10:15 – 10:25 | **Dr. Damian Micomonaco** | An Angiographic Study of the Anatomy and Distribution of Blood Flow of the Ethmoid Arteries |
| 10:25 – 10:30 | Interactive Discussion | |
| 10:30 – 10:40 | **Dr. Scott Hamilton** | Microvascular Changes in Oral Mucositis |
| 10:40 – 10:45 | **Interactive Discussion** | |
| 10:45 – 11:15 | **COFFEE BREAK** | |
| 11:15 – 11:25 | **Dr. Shamir Chandarana** | The Use of Autologous Platelet and Plasma Products Following Salvage Neck Dissections |
| 11:25 – 11:30 | **Interactive Discussion** | |
| 11:30 – 11:40 | **Dr. Kathryn Roth** | Outcome Analysis of Voice-Related Quality of Life Following Medialization Thyroplasty |
| 11:40 – 11:45 | **Interactive Discussion** | |
| 11:45 – 12:10 | **Dr. Joseph Wong** | Smile China – An Experience to Share |
| 12:10 – 12:15 | **Interactive Discussion** | |
| 12:15 – 1:30 | **LUNCH** | |

# CHAIRMAN – DR. COREY MOORE

| | | |
|---|---|---|
| 1:30-1:45 | **Presentation of Awards** | |
| 1:45 – 1:55 | **Dr. Matthew Bromwich** | Active Audiometry: The Sound of Silence |
| 1:55 – 2:00 | **Interactive Discussion** | |
| 2:00 - 2:10 | **Dr. Maya Sardesai** | Qualitative and Quantitative Dermal Changes with Subdermal Fat Grafting of Cutaneous Scars |
| 2:10 - 2:15 | **Interactive Discussion** | |
| 2:15 - 2:25 | **Dr. Sumit Agrawal** | 3D Endoscopy of the External Auditory Canal: A Step Towards Virtual Reality |
| 2:25 - 2:30 | **Interactive Discussion** | |
| 2:30 - 2:40 | **Dr. Khaled ElJallah** | Donor-Site Morbidity Following Scapular Free-Tissue Transfer in Head and Neck Surgery |
| 2:40 – 2:45 | **Interactive Discussion** | |
| 2:45 – 3:20 | **Dr. Simon Kirby** | Lillypads and Pyramids: Models for Peak Performance |
| 3:20 – 3:25 | **Interactive Discussion** | |
| 3:25 – 4:00 | **Dr. Vito Forte** | The Paediatric Otolaryngology Networl |
| 4:00 – 4:10 | **Interactive Discussion** | |
| 4:10 – 4:25 | Evaluation Form Completion | |

# PREOPERATIVE LOCALIZATION OF PARATHYROID ADENOMAS USING SPECT/CT HYBRID IMAGING: PRELIMINARY RESULTS

**Mr. Luke Harris**

**Purpose**: The aim of this study is to determine the accuracy of SPECT/CT hybrid imaging in predicting the exact anatomical location of parathyroid adenomas.

**Methods**: Patients being offered surgical treatment for primary hyperparathyroidism by a Department of Otolaryngology surgeon receive a SPECT/CT scan. Using the image, a nuclear medicine physician will plot out the location of the parathyroid adenoma using the midpoint of the cricoid as the origin and X, Y, and Z coordinates. Intraoperatively, the surgeon will plot out the location of the parathyroid adenoma using the same anatomical origin as the nuclear medicine physician. Surgeons also responded 'yes' or 'no' to the question: was the parathyroid adenoma in the exact anatomical position predicted by the SPECT/CT scan?

**Preliminary Results**: To date, 14 patients underwent SPECT/CT and parathyroidectomy. Surgeons identified 15 adenomas in these patients. Thirteen patients had a single adenoma and one patient had two adenomas. SPECT/CT imaging correctly predicted the exact anatomical location of 14 of 15 parathyroid adenomas. The remaining adenoma was not identified by the scan due to a thyroid adenoma which took up the radiotracer. The following results are for the 14 parathyroid adenomas correctly localized by SPECT/CT: In the X axis (lateral), the image was off by an average of 7.2 mm (95% 4.7-9.7 mm). In the Y axis (superior/inferior), the image was off by an average of 7.1 mm (95% 3.0-11.2 mm). In the Z axis (anterior/posterior), the image was off by an average of 8.2 mm (95% 5.1-11.3 mm).

A conclusion cannot yet be made about this study, as only preliminary results will be presented.

# DIFFERENTIAL PROFILES OF VOICE-RELATED QUALITY OF LIFE IN PATIENTS WITH AND WITHOUT BENIGN VOCAL FOLD LESIONS

**Mr. W. Robert Leeper**

**Objective:** To assess the utility of the Voice-Related Quality of Life (V-RQOL) instrument in detecting and quantifying differences between patients exhibiting hyperfunctional voice disorders with and without benign vocal fold lesions.

**Methods:** Comparative analysis of patient data including V-RQOL scores (physical functioning, social-emotional, and total score) from dysphonic patients with (n = 29) and without (n = 12) benign vocal fold lesions. These data are also compared with normative data from non voice patients (n = 22).

**Results:** Predictable and statistically significant differences were noted between the two groups of dysphonic patients for both the physical functioning (PF) domain and total scores of the V-RQOL instrument. Patients with established benign vocal fold pathology exhibited significantly lower PF scores than those in the non lesion group (77 vs 54, $p < 0.05$); total V-RQOL scores were also found to be significantly different between the groups (79 vs 59, $p < 0.05$). Further, discriminant analysis suggests that the PF score has good utility to differentiate between the two groups.

**Conclusions:** The V-RQOL instrument appears to hold potential as a useful tool for differentiating dysphonic patients with hyperfunctional voice disorders who have entered the phase of established vocal fold pathology from those in the pre-lesion category.

# AN ANGIOGRAPHIC STUDY OF THE ANATOMY AND DISTRIBUTION OF BLOOD FLOW OF THE ETHMOID ARTERIES

**Dr. Damian Micomonaco**

**Background:** The basic understanding of the blood supply to the nose is historically well documented. It is accepted that both the internal and external carotid systems supply blood to the nose and sinus cavities via the ethmoid arteries and the sphenopalatine arteries respectively. It is generally described that the majority of the blood supply to the nose is via the sphenopalatine artery but the relative contributions of the ethmoid arteries and sphenopalatine arteries has never been formally documented. More specifically, the significance of the ethmoid arteries as contributors to the blood supply of the nose remains poorly described. Based on clinical anecdotal experience, the ethmoid arteries are noteworthy contributors to blood supply in the nose in 10% or less of cases. This information would be relevant to surgeons managing patients with epistaxis as well as those patients undergoing endoscopic sinus surgery. Although not proven, it is generally accepted that 90% of epistaxis is anterior. However, the territory of artery and therefore source is not clearly defined. Kirchner et al (Surgical Anatomy of the ethmoidal arteries. Arch Oto 1961) has previously published that the anterior ethmoid artery is absent 7-14% of the time. Therefore the artery is present 86-93% of the time, however its contribution to nasal blood flow is unknown.

**Objective:** To define the incidence of a significant contribution to nasal blood flow from the ethmoid arteries using data from angiography. We hope to delineate and quantify the relative contributions of the sphenopalatine and ethmoid arteries to nasal bloodflow and therefore define the clinical significance of ethmoid artery contribution.

**Method:** A prospective analysis of 109 patients undergoing routine neuro-angiographic procedures that include visualization of both the internal and external carotid systems. The significance of ethmoid vs. sphenopalatine artery blood flow to the nasal septum is quantified by one neuroradiologist using a data collection sheet. Data is being analyzed to determine the incidence of clinically significant blood flow to the nasal septum from the ethmoid arteries.

**Results:** Data collected and under analysis.

**Conclusion:** Pending.

# MICROVASCULAR CHANGES IN ORAL MUCOSITIS

**Dr. Scott Hamilton**

Oral mucositis is one of the most significant toxicities for patients undergoing chemotherapy or radiotherapy for head and neck tumours. Despite increasing evidence that inflammatory mediators and microcirculatory changes play a pivotal role in the development of mucositis, there is a lack of objective measures or effective treatments for this debilitating side effect.

Orthogonal Polarized Spectral (OPS) imaging is a novel method of evaluating microvascular circulation in real-time. This technology utilizes a non-invasive hand-held microscope that polarizes and filters light in order to obtain images of the microcirculation. Quantification of circulatory markers such as red blood cell flow, aggregation and white blood cell extravasation are then possible. This technology has been successful implemented in the study of sepsis, inflammatory bowel disease and transplantation.

A prospective, cohort observational study is underway using OPS imaging to examine the sublingual microvascular changes in patients undergoing radiotherapy or chemoradiotherapy for head and neck tumours. Study objectives and design will be discussed.

This pilot study will determine the applicability of OPS imaging as a quantitative grading tool for radiation-induced mucositis. The effectiveness of OPS imaging in *predicting* the severity of symptoms will also be evaluated. Longitudinal changes in patients undergoing treatment will be compared to the currently proposed mechanism of mucositis.

# THE USE OF AUTOLOGOUS PLATELET AND PLASMA PRODUCTS

# FOLLOWING SALVAGE NECK DISSECTIONS

**Dr. Shamir Chandarana**

**Objectives:** Patients undergoing primary chemoradiotherapy or radiotherapy for advanced head and neck mucosal cancers often require salvage neck dissections. Early wound complications and late neck fibrosis are concerns following surgery in these patients. As well, prolonged wound drainage and lack of tissue adhesion may delay wound healing. Autologous fibrin and thrombin can provide the adhesive qualities for wound healing while autologous platelet rich plasma can further promote natural wound healing. These patient-derived alternatives to allogenic tissue adhesives from pooled human plasma, eliminate the risk of transmissible diseases and may have wound healing advantages.

This is the first known investigation of autologous platelet and plasma products and their effect on wound healing and neck fibrosis following neck dissections.

The objectives of this study are: **Primary Objective**- to compare the effect of intraoperative application of autologous platelet-rich plasma and platelet poor plasma/fibrin (PRP/PPP) on post-operative wound drainage in patients undergoing salvage neck dissection versus no PRP/PPP.
**Secondary Objective -** to compare the visco-elastic properties of the cervical skin following neck dissections in patients treated with intraoperative PRP/PPP versus no PRP/PPP.

**Methods:** Patients undergoing neck dissection for cervical metastases without primary site resections were selected for this study. In a patient-blinded non-randomized manner, patients considered to be at higher risk of wound problems were treated with PRP/PPP. The PRP/PPP was derived at the time of surgery from 60cc of the patient's own blood using the Biomet Gravitational Platelet Separation® system and applied to the neck dissection wound immediately prior to skin closure. Post-operative wound drainage, complications, and length of hospital stay were compared with neck dissection patients who underwent standard wound closures without the use of PRP/PPP.

The long-term post-operative cervical skin fibrosis was quantified in the neck dissection patient using the Cutometer® MPA 580 by a blinded examiner. Validated parameters labeled "R2" and "F0" were compared between the cohorts where PRP/PPP were and were not applied.

**Results:** Twenty-six patients undergoing 31 neck dissections were included in this study. The mean follow-up time was 24 months. PRP/PPP was used in 12 patients (12 neck dissections) and were compared to 14 patients who did not receive PRP/PPP.
A statistically significant difference ($p = 0.03$) was seen in the post-operative drainage (PRP/PPP: 253cc vs. noPRP/PPP: 345). Furthermore, the average length of stay for the PPP group was 3.13 days vs. 3.86 for the control group ($p = .004$). The Cutometer detected a significant difference in skin visco-elasticity between the study group ($R2 = 0.86$, $F0 = 13.13$) and the control group ($R2 = 0.77$, $F0 = 15.98$) ($p = 0.05$, $p=0.05$).

**Conclusion:** The application of autologous PPP/PRP in neck dissections resulted in decreased post-operative drainage, length of stay in hospital and neck skin fibrosis. The potential benefits of these products warrant further investigation.

# OUTCOME ANALYSIS OF VOICE-RELATED QUALITY OF LIFE FOLLOWING MEDIALIZATION THYROPLASTY

**Dr. Kathryn Roth**

**Objectives:** Primary objective - To prospectively evaluate patient-based voice outcomes following medialization thyroplasty. Secondary objective - To compare voice outcomes between two common medialization thyroplasty techniques: carved silastic blocks and a pre-fabricated implant. The final aim of the study was a cost analysis to compare the implant and operative costs associated with each thyroplasty device.

**Methods:** All subjects were diagnosed with unilateral vocal fold paralysis. Voice outcomes were quantified with the Voice-Related Quality of Life (V-RQOL), a validated instrument to measure impact of voice disorder on two domains: physical functioning and social-emotional. (1) A prospective single-institution cohort was evaluated. All subjects received a pre-fabricated (Montgomery) implant. The V-RQOL was administered preoperatively, early postoperative and again late postoperative. (2) A cross-sectional, multi-centre, multi-surgeon cohort was evaluated for post-operative V-RQOL following medialization thyroplasty with either a pre-fabricated implant or a carved silastic block implant.

**Results:** Ten subjects were enrolled in the prospective trial. Overall V-RQOL scores were significantly improved following thyroplasty (95.83+/-4.41 pre-op vs 40.31+/-10.19 post-op; p=0.0000002). This improvement was consistent across both domains. No statistical difference in scores was found between early postoperative (mean 34 days) and late postoperative (mean 177 days).

Multi-centre comparison of post-operative V-RQOL scores revealed higher scores for the Montgomery implant (n=18) compared to the carved implant (n=31) in the physical functioning domain (89.7 +/-10.7 vs 75.69+/-19.4, p=0.003), social-emotional domain (93.75+/-10.7 vs 81.15+/-23.97, p=0.019), and overall score (91.32+/-9.8 vs 77.88+/-20.6, p=0.0048). Standard deviations were larger in the carved group indicating a greater degree of variability in patient outcomes. The cost analysis assessed set and variable costs per thyroplasty case. The initial cost of the Montgomery device exceeds the cost of a carvable silastic block. No significant reduction in procedure times was demonstrated using the pre-fabricated system. This correlated to no significant difference in time-dependent operating room, nursing, or anaesthesia costs.

**Conclusions:** Voice-related quality of life in patients with unilateral vocal fold paralysis is dramatically improved following medialization thyroplasty, and this beneficial effect is maintained over time. While there is a higher initial outlay cost for the Montgomery preformed implant, it yielded better and more consistent outcomes than the silastic carved implant in the population studied.

# ACTIVE AUDIOMETRY: THE SOUND OF SILENCE

**Dr. Matthew Bromwich**

**Objectives:** To evaluate the attenuation characteristics of Active Noise Reduction (ANR) Headphones. To develop a new method of screening audiometry that reduces the adverse affects of ambient low frequency background noise by using ANR headphone technology.

**Design:** Part 1: Prospective objective tests within an anechoic chamber evaluated the attenuation and physical properties of the ANR headphones. Part 2: A clinical prospective crossover study compared routine audiometry with ANR headphone audiometry. Setting: Tertiary care hospital.

**Methods:** *BOSE Aviation X* circumaural ANR headphones were tested for both active and passive attenuation properties in a hemi-anechoic chamber using a Head and Torso Simulator (HATS). Subsequently 19 otology clinic patients underwent standard audiometry in a sound booth and ANR audiometry in a 50 dB sound field. Main outcome measures: Part 1 - Objective SPL attenuation levels. Part 2: Pure tone audiometric data from standard and ANR audimetry with and without background noise.

**Results:** Objective attenuation levels of up to 15-25 dB were achieved at frequencies below 2000 Hz. In standard audiometric testing, 50 dB of narrow band background noise decreased patient pure tone thresholds by 25 dB at 250 Hz. The use of ANR technology during subsequent audiometric testing provided an additional 13 dB of attenuation at these frequencies. This provided a significant improvement in the ability to achieve normal test results despite 50 dB of background noise ($p=<0.001$).

**Conclusions:** The use of ANR technology in screening audiometry provides more reliable results in an environment of ambient low frequency background noise. ANR headphone audiometry also improves the sensitivity of audiometric testing for mild low frequency hearing loss. This technology may have important applications for routine screening in schools, industrial settings, and community practices.

# QUALITATIVE AND QUANTITATIVE DERMAL CHANGES WITH SUBDERMAL FAT GRAFTING OF CUTANEOUS SCARS

**Dr. Maya Sardesai**

**Objective:** To evaluate changes in the following variables with subdermal fat grafting of cutaneous scars: dermal elasticity, vascularity, pigmentation, patient perception of scar characteristics, patient satisfaction, observer assessment of scar characteristics and improvement.

**Methods and Materials:** Fourteen patients with a variety of scar types were treated with subdermal fat grafting over a thirty-month period. All variables were evaluated pre-operatively and one year after treatment. Dermal elasticity was measured using the Cutometer SEM575 skin elasticity meter (Courage&Khazaka Electronic GmbH, Cologne, Germany). Pigmentation and vascularity were measured using the DermaSpectrometer (Cortex Technology, Hadshund, Denmark). Patient perception was evaluated using validated Patient Scar Assessment Scales, and a Post-Treatment Satisfaction Scale. Validated qualitative evaluation was performed by a skilled observer using the Observer Scar Assessment Scale, the Vancouver Scar Scale, and an Observer Pre and Post Treatment Evaluation questionnaire.

**Results:** Significant improvements were observed in dermal elasticity, patient and observer perception of scar thickness, patient perception of stiffness, and observer perception of relief and pliability ($p<0.05$). A trend toward significance was seen in observer assessment of height as evaluated by the Vancouver Scar Scale ($p<0.1$). No significant differences were seen in quantitative and qualitative evaluation of vascularity and pigmentation ($p>0.1$). No significant difference in pain, pruritis, and irregularity were reported by patient questionnaire ($p>0.1$).

**Conclusions:** Although fat grafting represents a subdermal process, it appears to improve certain dermal characteristics including elasticity, skin thickness, stiffness, and pliability as evaluated by quantitative and validated qualitative measures. Fat grafting of cutaneous scars does not appear to affect skin colour, vascularity, or patient symptoms. This is the first study to quantitatively and qualitatively evaluate and report the clinical dermal changes associated with subdermal fat grafting of facial scars

# 3D ENDOSCOPY OF THE EXTERNAL AUDITORY CANAL:

# A STEP TOWARDS VIRTUAL REALITY

**Dr. Sumit Agrawal**

The objective of this project was to recreate the 3D anatomy of the external canal into computerized model. This model will then be incorporated into a comprehensive virtual-reality surgical simulator for otologic surgery.

The goal was to create these models from real patients in vivo, without the need for costly equipment, time, or risk. Due to the size of the external auditory canal, traditional 3D mapping techniques including moiré topography, fringe contouring, 3D holography, and imaging are ineffective.

This project will explore recreating the 3D anatomy from a simple 2D endoscopic video. This structure from motion problem is complex and endoscopic images suffer from non-uniform lighting, erratic movement, and barrel and cushion distortion. Using feature detection, motion vectors, camera tracking, and 3D point reconstruction, an accurate 3D point cloud of the external canal has been created.

# DONOR-SITE MORBIDITY FOLLOWING SCAPULAR FREE-TISSUE TRANSFER IN HEAD AND NECK SURGERY

**Dr. Khaled El Jallah**

Shoulder disability following scapular free tissue transfer is widely recognized, but has not been well studied. The purpose of this study is to comprehensively evaluate quantitative and qualitative donor site morbidity following osteocutancous and fasciocutaneous scapular free tissue harvest.

**Methods and Measures:** Design: Single-center cross-sectional study. Subjects: Experimental group (n=10)- patients who underwent osteocutaneous or fasciocutaneous scapular free flap harvest. Control group (n=10)- patients who underwent free flap harvest from sites other than scapular, latissimus, or lateral arm flaps. All patients underwent ipsilateral neck dissection, and were 1+ year following surgery.

**Outcome measurcs:** Quantitative measurements of muscle strength and range of motion (ROM) of shoulder and neck were performed by a blinded physiotherapist. Qualitative assessment was performed using validated quality-of-life (QOL) instruments- the Shoulder Pain and Disability Index and the Neck Disssection Impairment Index.

**Results:** Patients who underwent osteocutaneous scapular free flap demonstrated measurable decreased strength in the ipsilateral shoulder. There was decreased flexion ($p=0.01$), abduction ($p=0.05$), and external rotation ($p=0.03$). These patients also had decreased neck side flexion strength towards the contralateral side ($p=0.05$). Interestingly, the contralateral shoulder exhibited increased external rotation ROM ($p=0.03$). No differences were measured between the fasciocutaneous group and the control group. No differences were measured in QOL scores between all groups.

**Conclusions:** Osteocutaneous scapula flaps result in measurable objective changes in ipsilateral shoulder strength, neck strength, and contralateral shoulder ROM. Fasciocutaneous scapula flaps did not alter shoulder function. These objective changes did not translate into a decrease in QOL scores, possibly indicative of adequate compensation
by the contralateral shoulder.

# SPONSORS

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# AWARDS & PRIZES

## SCIENTIFIC ACHIEVEMENT AWARD:

***Presented for the most outstanding scientific achievement.***

Charles A. Thompson Plaque
Thomas A. Martin Award

## PETER CHESKI INNOVATIVE RESEARCH AWARD

***Presented for the most innovative research.***

## GOLDEN THROAT AWARD

***Presented for the most eloquent presentation including evaluation of audio-visual aids.***
St. Joseph's Health Care London Award

## RESIDENT BOOK AWARDS

***Presented to residents who did not receive one of the above awards.***

## SIMON KIRBY MOST CARING RESIDENT AWARD

***Presented to the resident who demonstrates excellence in compassionate care.***

## UNDERGRADUATE TEACHING AWARD

***Sponsored by Abbott Laboratories and presented to the resident with the highest teaching evaluation.***