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Dr Howard Clarke: President / Président
Dr Peter Lennox: Vice President / Vice-président, Scientific Program Chair / Comité de programme scientifique
Murray Allen & Tracey Thomson: Local Organizing Committee Chairs / Présidents, Comité d'accueil

EYE OPENER SESSION

0001
RECONSTRUCTION OF THE RADIATED BREAST: TIMING, ADVANCED TECHNIQUES, AND OUTCOMES

M Clemens
Houston, TX, USA

Learning Objectives:
1. Participants will be able to identify optimal timing of breast reconstruction in the setting of radiation therapy.
2. Participants will be able to describe effects of neoadjuvant versus adjuvant chemotherapy and different types of radiation on breast reconstruction.
3. Participants will be able to describe major predictors and protectors of complications in reconstructing the radiated breast.

GENERAL SCIENTIFIC SESSION

01
UPPER EXTREMITY LYMPHEDEMA FOLLOWING ELECTIVE AND TRAUMA HAND SURGERY IN BREAST CANCER SURVIVORS

H Baltzer*, C Oh, J Harvey, P Fox, S Moran
Toronto, ON

PURPOSE: To evaluate the risk of developing 'late-onset' upper extremity lymphedema following hand surgery among breast cancer (BC) survivors who underwent ipsilateral axillary lymph node dissection (ALND), sentinel lymph node biopsy (SLNB) and/or radiation therapy (RT).
METHOD: A retrospective cohort of BC survivors treated with ALND, SLNB and/or RT was identified between 1997 and 2012. Survivors with ipsilateral hand surgery with ≥1 year of follow up were included. The primary outcome was documented lymphedema following hand surgery (defined as requiring intervention). Demographic data and clinical information pertaining to hand surgery and BC treatment were compared between patients with and without lymphedema.
RESULTS: Of the 142 survivors included, 12 (8.4%) developed lymphedema following hand surgery. BC survivors with and without lymphedema were similar in age, BMI and tourniquet use. Average tourniquet time was greater among women with lymphedema (63 vs. 34 minutes, p=0.02). On univariate analysis, lymphedema was associated with a surgery for hand trauma (75% vs 23%, p=0.002), RT (91% vs. 50%, p<0.01), ALND (75% vs. 34%, p=0.01), number of nodes removed (15 vs. 7, p=0.002) and chemotherapy (91% vs. 34%, p=0.02).
CONCLUSIONS: These data suggest that BC survivors, particularly after more extensive nodal dissection and adjuvant therapies, that have hand surgery for trauma may benefit from prophylactic anti-lymphedema modalities. Larger population studies of this high-risk population are needed to further address this question.
Learning Objectives:
1. Review potential risks of lymphedema among breast cancer survivors, including hand surgery.

02
BRINGING PATIENT ADVISORS TO THE BEDSIDE OF DIGIT REPLANTATION PATIENTS: A PROMISING AVENUE FOR IMPROVING PARTNERSHIP BETWEEN PATIENTS AND THEIR CARE TEAM AND THEIR DISABILITIES.

S Cassier, J Arsenault, M Moreau, K Vigneault, MP Pomey, A Danino*
Montréal, QC

PURPOSE: We describe a model that brings former selected replanted patients (patient advisors) directly to the patient's bedside as full-fledged members of the clinical team.
METHODS: A prospective pilot study was conducted from July 2014 to June 2015. All patients admitted were offered the option to meet one of our patients advisors within 5 days post-surgery as well as at 8, 16, 36 and 52 weeks following hospital discharge. All patients who had at least one interaction with a patient advisor during the pilot phase of the project were interviewed by telephone. The patients expectations, any possible reluctance, the contribution of the patient advisor in their care pathway and the difficulties encountered were discussed. Objectives measurements included the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire, hand strength, range of motion, and sensibility as well as self- reported measures of pain and adherence to the treatment.
RESULTS: 110 patients were admitted in our centre, 40 of whom had at least 3 interactions with a patient advisor. Preliminary DASH data on 9 patients demonstrated a decrease of 33,8% in patient's perceptions of their disabilities after their meeting with patient advisors between 8 weeks and 4 months after discharge. Adherence to the prescribed treatment plan was increased by 50% with patient advisor's collaboration.
CONCLUSIONS: Patient advisors support seems to increase patients' adherence to treatment and, consequently, to enhance functional recovery.
Learning objectives:
We describe the first results obtained after experiencing a new model for patients' care, that will improve their functional recovery and quality of life.

03
EFFECT OF FOREARM WARMING COMPARED TO HAND WARMING FOR COLD INTOLERANCE FOLLOWING UPPER EXTREMITY TRAUMA

C Novak*, Y Li, H von Schroeder, D Anastakis, G Fernie, S McCabe
Toronto, ON

PURPOSE: This study evaluated forearm versus hand warming and control conditions to improve symptoms of cold intolerance after hand trauma compared to controls.
METHODS: Adults at least 3 months following hand trauma with cold intolerance and age/sex matched controls were included. Testing sessions (forearm warming, hand warming, control) in a climate laboratory monitored continuous skin temperatures (baseline, cold exposure (1º C), recovery), sensation, strength, dexterity and self- report. Statistical analyses evaluated the relationships between the dependent and independent variables.
RESULTS: Hand trauma patients (n=9; mean age 34±12 yrs) and controls were assessed. With bare hands, skin temperatures changed (p<0.001) from

baseline (31.8±2.6°C), cold exposure (15.2±3.3°C) and rewarming (30.1±3.4°C). Minimum cold temperatures were lower in injured (14.3±3.5°C) compared to uninjured (16.9±4.1°C) digits but not significant. Skin temperatures improved with treatment ($p<0.001$); compared to bare hands, glove warming significantly increased the minimum temperature during cold (patients and controls) and the maximum rewarming temperature. Forearm warmers significantly ($p=0.03$) increased the baseline temperatures (injured vs. uninjured digits). Wearing gloves decreased ($p<0.05$) grip strength and pegboard performance in patients. Significantly ($p<0.05$) better thermal sensation was reported with forearm and hand warming and in injured vs non-injured digits. Patients reported higher pain levels with cold exposure with no significant treatment effect.

CONCLUSIONS: There was cold response variability in both groups. Hand trauma patients had a greater change from baseline to minimum cold temperature and glove warming improved skin temperatures. Cold air exposure with continuous temperature monitoring may identify subtle changes with cold-induced pain and potential warming interventions.

Learning Objectives:

Participants will be able to understand: 1. cold responses in patients with cold intolerance and controls; 2. different warming responses and possible interventions for cold intolerance.

CANADIAN EXPERT

004

HAND AND WRIST INJURIES IN THE ELITE LEVEL ATHLETE

R French
Surrey, BC

Far more than the injury itself, injury in an elite or professional athlete sets in motion a complex situation that is dynamic and involves multiple stakeholders. The treatment options in the elite athlete are no different than those for the weekend athlete however factors related to the demands of the particular sport, the position played, where the athlete is in the current season and their career, etc. require that treatments be meticulously customized to the athlete. Standard, "cookie-cutter" treatment plans are rarely applicable. Recognition of the short, intermediate, and long term risks and possible outcomes of the various treatment options must be carefully weighed against the unique mind set and characteristics of the elite athlete who often wishes to compete at all costs.

Learning Objectives: By the end of the presentation, the attendee will be able to:

1. Appreciate the complexities of treating athletes of all levels and ways to individualize treatment appropriate to their level;

2. Recognize the roles and responsibilities of a team physician and the interaction with various stakeholders;

3. Demonstrate an understanding of sport-specific issues affecting timing of surgery and return-to-play decisions;

4. Demonstrate an ability to formulate a list of treatment options and a preferred treatment for hand and wrist injuries in elite athletes;

5. To recognize some of the pitfalls in treating sports-related hand and wrist injuries.

DISCLOSURE: Paid consultant for the Calgary Flames; gifts in kind from the NHL and NHL Flames Association; paid travelling team doctor for Canada Snowboard Team; patent held on wrist cut resistant protectors with slash guards for hockey marketed by LuLuLemon.

04

COST-EFFECTIVENESS ANALYSIS OF DIEP VERSUS FREE MUSCLE-SPARING TRAM IN POST-MASTECTOMY BREAST RECONSTRUCTION

M Tan*, W Isaranuwatchai, T Delyzer, K Butler, S Hofer, T Zhong
Toronto, ON

PURPOSE: Our objective was to perform a cost-effectiveness analysis (CEA) comparing two commonly used breast reconstruction methods: deep inferior epigastric perforator (DIEP) flap and muscle-sparing transverse rectus abdominis myocutaneous (MS-TRAM) flap.

METHOD: A retrospective cohort study was performed involving all women receiving DIEP or MS-TRAM flaps at the University Health Network (UHN) between 2008 and 2012. The patient-reported outcomes (PROs) were obtained from six subscales of the BREAST-Q Post-Reconstruction Module at two-years follow-up. The cost data were obtained from the UHN Case Costing system and included the initial reconstruction, hospital stay, and any subsequent hospitalization due to complications within the two-year period. Complications were tracked using the electronic patient record. The incremental cost-effectiveness ratio (ICER) was calculated for each subscales and adjusted for characteristic differences between the two groups. Cost-effectiveness acceptability curves (CEAC) were used to characterize the uncertainty of the findings.

RESULTS: A total of 227 patients (180 DIEP, 47 MS-TRAM) were reviewed. Baseline characteristics between the two groups were similar, with the exception of more unilateral DIEP flaps than MS-TRAM flaps. Twelve (7%) DIEP and three (6%) MS-TRAM patients developed complications requiring hospitalization. DIEP patients had significantly fewer abdominal hernia or bulge ($p=0.039$). Total costs and PRO were similar between the two groups. Adjusted ICER revealed that, compared to MS-TRAM, DIEP flap was the dominant option (cost less, more effective) in two PRO domains, 'Satisfaction with Outcome' and 'Physical Well-being of Abdomen', with a 70% and 94% probability of being cost-effective on the CEAC, respectively, at willingness-to-pay of $5,000.

CONCLUSIONS: The results of our study suggest that DIEP flap could be a cost effective option when compared to MS-TRAM with respect to higher satisfaction with outcome and abdominal well-being.

Learning Objectives:

1. Recognize the importance of CEA in evaluating health interventions; and

2. Contrast CEA from other scientific analyses.

05

THE AUTOMATED VASCULAR CLASSIFICATION SYSTEM (AVDS): M FLOW USING ARTIFICIAL INTELLIGENCE

J Kanevsky, T Safran*, A Kanevsky, T Snaith, O Foudaneel
Montréal, QC

PURPOSE: The detection of vascular complications following free tissue transfer is difficult to measure using quantifiable methods. In addition, monitoring and rapid recognition of ischemia and other circulation related complications are essential to achieve high flap success rates. The purpose of this study was to develop a computer program to test a novel system capable of analyzing a free tissue transfer and detecting abnormal vascular flow within the vessel to help with early detection of flap compromise.

METHODOLOGY: Based on principles in speech recognition segmentation, this study explored a novel machine learning technique to automatically classify vascular flow as normal or abnormal. Specifically, a Neural Network/Hidden Markov hybrid for abnormal flow detection was utilized. To train the model, ninety minutes of vascular flow audio data was collected from 37 patients with free-tissue transfers. The algorithm was then evaluated using a held-out test set with new data not utilized in the training model.

RESULTS: The algorithm scored a 94.7% detection rate with a 3.2% false alarm rate despite varying quality of vascular flow audio. This high detection rate shows potential for significantly improving methods of vascular flow monitoring.

CONCLUSIONS: Accurate and constant monitoring systems can provide decreased reliance on manual methods of abnormal flow recognition and an increase in early detection of flaps with vascular compromise, leading to better outcomes and patient satisfaction.

Learning Objectives:

The learner will be able to comprehend how a machine-learning algorithm can parse and categorize blood-flow audio. The learner will begin to understand the Sigmoid Function, Gradient Descent, and Back-Propagation algorithms that comprise a hybrid-learning architecture. The learner will be able to view how proper free flap evaluation can lead to better outcomes and patient satisfaction.

06

OUTCOME ANALYSIS OF MEDIAL TRICEPS MOTOR NERVE TRANSFER TO AXILLARY NERVE IN ISOLATED AND BRACHIAL PLEXUS-ASSOCIATED AXILLARY NERVE PALSY

E Krauss*, S Noland, L Kahn, S Mackinnon
St Louis, MO, USA

PURPOSE: Originally described using the branch to long head of triceps (1), our institution has performed the triceps to axillary nerve transfer using the medial triceps branch since 2007 to reconstruct axillary nerve function in both brachial plexus and isolated axillary nerve palsies. This is the first large series assessing outcomes from medial triceps to axillary nerve transfer from our center.

METHOD: A retrospective chart review of patients treated with a medial triceps to axillary nerve transfer for complete axillary nerve palsy was performed. Patient demographics, injury mechanism, associated injuries, electrodiagnostics (EMG) and time to surgery were analyzed. Pre-and post-operative function was assessed using MRC muscle strength grading and the DASH questionnaire. Subgroup analysis for brachial plexus and isolated axillary nerve injuries was performed.

RESULTS: Fifty-eight patients were treated with medial triceps to axillary nerve transfer. Sixteen (16) patients were excluded for insufficient follow-up (<5 months). Median pre- and post-operative DASH scores were 56.7 (N=29, range 6.7-84) and 31.2 at final follow-up (N=27, range 0-80.8). Only 4 patients had weak or no re-innervation in deltoid muscle after transfer. MRC grade 3 or greater was achieved in 73.7% of patients, 21% achieved near perfect results (MRC 4+). No patients achieved normal function.

CONCLUSIONS: Medial triceps nerve branch is a strong donor for triceps to axillary nerve transfer; however, injury factors may limit the motor recovery in this complex patient population.

Learning Objectives:

1. Describe the surgical approach to medial triceps to axillary nerve transfer; and 2. Outline the indications and operative guidelines to optimize postoperative patient outcome in axillary nerve palsy.

Reference: *1. Leechavengvongs S, Witoonchart K, Uerpairojkit C, et al. Nerve transfer to deltoid muscle using the nerve to the long head of the triceps, part II: a report of 7 cases. J Hand Surg 2003;28A:633-638.*

07

LLSAN MYOCUTANEOUS V-Y ISLAND FLAP FOR NASAL RECONSTRUCTION: A NOVEL TECHNIQUE?

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PURPOSE: Many options exist to reconstruct nasal defects; however to our knowledge a myocutaneous island flap based on the levator labii superioris alaeque nasi (LLSAN) muscle has not been described to reconstruct nasal defects. Our objectives are to present our technique to resurface alar defects and to confirm the novel nature of this technique with our Canadian colleagues.

METHOD: A retrospective chart review of 18 patients with nasal defects following cutaneous tumour resection in 2015 was undertaken. The surgical technique is straightforward. Markings for a V-shaped flap to recruit skin from the lateral wall are made. The medial side of the flap is then incised to the periosteum and perichondrium. The LLSAN origin on frontal process of the maxilla is released to obtain caudal movement of the flap. The skin lateral to the flap is then developed in the subcutaneous plane to expose the muscle and, if necessary, to release dermal insertions to alar skin. The flap is then trimmed to the defect shape and inset. The donor site closed in a V to Y pattern by recruiting laxity at the radix.

RESULTS: All procedures were completed under local anesthesia. The average age of patients was 75 years. All flaps healed without necrosis. One case of hematoma was managed expectantly. Patient satisfaction is high. Slight alar notching was present in one patient. Trap door phenomenon eventually subsides. No patients requested revision surgery.

CONCLUSIONS: A LLASN muscle island flap is a reliable technique to add to a plastic surgeon's nasal reconstruction arsenal.

Learning Objective:

At the end of this lecture the learner will be able to consider LLSAN myocutaneous V-Y island flap as an interesting alternative technique for nasal reconstruction.

08

MOHS FOR THE NOSE: MEDIAL-CAUDAL POSITIVE MARGINS ARE MORE COMMON IN ALAR RIM BASAL CELL CARCINOMAS

J Stone, J Redwood, A Frolkis*, J Dawes
Calgary, AB

PURPOSE: The purpose of our study was to examine the largest retrospective cohort of patients who have undergone Mohs surgical treatment for basal cell carcinomas (BCC) of the alae. A novel method of analyzing Mohs maps was created to examine directionality of positive margins.

METHODS: All patients undergoing reconstruction following primary BCC excision of the nasal alae were recruited through a single institution. Patient demographics, details of resection and reconstruction were recorded. Positive margins were scored using a quadrant-based directionality system. Defect size was classified as large or small stratified by median defect area. Fisher's exact-tests were performed.

RESULTS: A total of 124 patients were included (63 male; 61 female). Mean age at time of surgery was 67±12.7 years. Most patients required multiple levels for dermatopathological clearance (n=101, 81.5%). Directionality was found to be preferentially positive in the medial-caudal direction (n=22, 18%), medial-cephalad direction (n=13, 11%), and lateral-caudal direction (n=10, 8%). Median defect area was 0.81cm2 (Q1: 0.55, Q3: 1.5). Defect size significantly influenced reconstructive method ($p<0.01$). Small defects were commonly treated with secondary intention (n=24, 40%), while larger defects were reconstructed with nasolabial flaps and full thickness skin grafts (n=15, 25% and 22%). Follow-up time ranged from 0-87 weeks and complications were low (n=14, 11.2%).

CONCLUSION: Surgical margins are preferentially positive in the medial-caudal direction in the alar region. A negative margin in Mohs surgery is an acceptable method of ensuring oncological clearance in a sensitive cosmetic area, which historically has had high recurrence rates when treated without Mohs. Reconstruction under local anesthetic is safe and complication rate is low.

Learning Objectives:

To better understand the role of Mohs surgery in the alar region and reconstructive planning.

09

THE KEYSTONE FLAP – PRACTICAL DESIGN, USE AND DIVERSE APPLICATIONS

C White
Victoria, BC

PURPOSE: We documented our clinical experience using the keystone flap for various different defects over the body. We review the advantages and disadvantages of the keystone flap as well as technical pearls with regards to raising the flap and some of its modifications.

METHOD: We show a case series of 16 patients all of whom have had skin cancer resections (sizes 2 x 2 cm to 6 x 6 cm, mean = 3 x 3 cm). All of these patients are shown with surgical images to exemplify the diversity of the reconstructions. All of the flaps survived with the most common complication being minor crusting at the suture lines.

RESULTS: Based on our clinical experience the keystone flap avoids tension on a closure. Donor skin graft sites are avoided, and thus there is no donor site care or pain. Keystone flaps avoid extremity splinting and they avoid the need for prolonged dressing care for partially healed wounds. There are better long term surgery site aesthetics compared to skin grafting. The drawbacks include the fact that a larger initial surgical area is needed and that the keystone flap requires more surgical time for suturing.

CONCLUSIONS: The keystone flap is an excellent reconstruction for full thickness skin defects from skin cancer resection all over the body. We conclude that it can be used reliably on the lower extremity, trunk, hand, calf, and scalp. There are many modifications that add to the versatility of the flap and the aesthetic and recovery time are better for the patient and

lead to less complexity post op care.

Learning Objectives:

1. Understand how to design the keystone flap;

2. Understand the different types of defects that the keystone flap can be used to reconstruct; and

3. Understand the different applications for the keystone flap in different body areas.

CANADIAN EXPERT

0010
HOW TO WRITE A MEDICO-LEGAL REPORT

S Krajden
Brampton, ON

Learning Objectives:

1. Understand the legal definition of informed consent and its relevance in our specialty;

2. Differentiate between standard of care and causation;

3. The difference between a provincial regulatory complaint and a malpractice lawsuit;

4. Discuss optimal patient encounter documentation;

5. Overview of the process of being qualified as an expert witness in court; and

6. Review of trial preparation, including cross-examination.

010
HAND FUNCTION IS A BEAUTIFUL THING - RECONSTRUCTION OF PINCH AND GRASP IN THE PEDIATRIC PATIENT

P Egerszegi
Montreal, QC

Learning Objectives:

Participants will understand:

1. The basis for satisfactory hand function

2. The required physical attributes in a hand to achieve satisfactory hand function

3. The functional problems associated with several congenital hand malformations

4. Surgical techniques available to improve hand function in these hand malformations.

10
THE IMPACT OF AUTOLOGOUS BREAST RECONSTRUCTION USING DIEP FLAP ON THE ONCOLOGIC EFFICACY OF RADIATION THERAPY

J Bou-Merhi*, C Maalouf, E Karam, C Bernier, A Gagnon, A Danino
Montréal, QC

INTRODUCTION: In the management of breast cancer radiation therapy plays a substantive role by decreasing local recurrence and increasing overall survival. There is controversy concerning compromised radiation delivery plans and suboptimal delivery after breast reconstruction (BR) with DIEP a flap. Our study aims to assess the oncologic safety of immediate BR with a DIEP flap in the setting of adjuvant radiation therapy.

METHODS: We conducted a retrospective review using a prospectively maintained database of all consecutive women undergoing BR with a DIEP flap. Eligible patients included those that underwent BR before or after radiation therapy with a minimum of two years follow up. Independent variables included patient age, cancer stage, tumor type and subtype, adjuvant and neoadjuvant chemotherapy, hormonal therapy, diabetes mellitus, and tobacco use. Main outcome variables were: local recurrence, distant metastasis, patient demise and total flap failure.

RESULTS: Sixty two patients were considered eligible (July 2008-January 2014), 32 (52%) had immediate BR followed by radiation therapy and 30 (48%) had delayed reconstruction preceded by radiation therapy. One flap failure was noted in each group. The two groups were comparable with respect to the independent variables. The mean age was 48±9 years, the median follow-up was 2.7yrs (2?5.6) for the immediate group and 7.7yrs (2.6-20) for the delayed (p<0.0001). Overall local recurrence occurred in 3.2% of patients: 3.3% in the immediate group and 3.1% in the delayed (p=0.963). Distant metastasis occurred in 6.4% of patients: 10% in the immediate group and 3.1% in the delayed (p=0.27). Breast cancer related mortality occurred in 4.8%: 6.7% in the immediate group and 3.1% in the delayed (p=0.52).

CONCLUSION: Our results showed no statistically significant difference between the two groups suggesting that immediate reconstruction with a DIEP flap in the setting of adjuvant radiation therapy does not affect the oncologic efficacy of radiation therapy. Further prospective studies are advocated.

Learning Objective:

Our learning objective is to familiarize plastic surgeons with the oncologic safety of radiation therapy in the setting of an immediate breast reconstruction with a DIEP flap.

11
SAME-DAY DISCHARGE FOR WOMEN UNDERGOING IMPLANT-BASED BREAST RECONSTRUCTION USING AN ENHANCED RECOVERY AFTER SURGERY MODEL IS SAFE

J Redwood*, D Dumestre, C Temple-Oberle
Calgary, AB

PURPOSE: To compare enhanced recovery after surgery (ERAS) with traditional recovery after surgery (TRAS) for patients undergoing implant-based breast reconstruction.

METHOD: A retrospective chart review of two patient groups (ERAS and TRAS) was performed. Data from patients undergoing implant-based breast reconstruction (immediate and delayed) from a single reconstructive surgeon working with three general surgeons was collected from February 2012 - October 2013 for the TRAS group and September 2013-2015 for the ERAS group. The ERAS protocol included day surgery, multimodal analgesia, and preoperative anti-emetic prophylaxis. The TRAS pathway involved overnight admission, narcotic-based analgesia, and no preoperative anti-emetic. Demographics, operative variables, and complication rates were compared between groups.

RESULTS: Sixty-three ERAS patients and 78 TRAS patients were included in the study. Length of stay was shorter for ERAS patients compared to TRAS patients (0.31 nights vs. 1.45 nights, p=0.00). No differences were observed between groups in the frequency of preoperative radiation (6% vs. 5%, p=0.70) or immediate reconstruction (97% vs. 89%, p=0.09). The ERAS patients underwent more bilateral mastectomies (83% vs. 55%, p=0.00) and direct-to-implant (vs. expander) reconstructions (65% vs. 24%, p=0.00). Despite the increased risk for the ERAS group due to more implant-based and bilateral reconstructions, there was no significant difference in major complications [repeat surgery, readmission, or IV antibiotics (13% vs. 9%, p=0.48)], minor complications such as seroma or partial tissue necrosis (29% vs. 27%, p=0.83), or number of postoperative emergency room visits (10% vs. 15%, p=0.3) within 30 days compared to the TRAS group.

CONCLUSIONS: ERAS protocol for implant-based breast reconstruction is safe, without increased readmission rates or emergency room visits compared to TRAS, and significantly decreased length of stay.

Learning Objectives:

To identify benefits and safety of an ERAS pathway for patients undergoing implant-based breast reconstruction.

12
RISK REDUCING MASTECTOMY: A RATIONAL MDT APPROACH

N Patel*, G Libondi, D Leff, L Side, J Knight, V Ramakrishnan
Winnipeg, MB

PURPOSE: Prophylactic mastectomy (PM) has become increasingly common and its practice varies worldwide often with little or no evidence of benefit. In patients with sporadic unilateral breast cancer, contralateral PM offers questionable survival advantage in most cases. We set up a multidisciplinary team (MDT) of breast surgeons, geneticists, plastic surgeons, psychologists and specialist nurses within our region to improve interaction and facilitate shared decision-making. The aim of this study was investigate the effect of a regional MDT on rationalising PM decision- making.

METHOD: Over the three year, 2011 to 2014, the MDT discussed 151 patients requesting PM. A retrospective review of patient case notes determined whether their requests were accepted or decline and factors justifying the decisions were observed.
RESULTS: PM requests were supported in just over half the cases (53%) and declined for a third (33%). The most common reason for not offering contralateral risk reducing surgery was low risk of developing contralateral breast cancer versus relatively high risk of systemic relapse from the primary disease (46%). A fifth of patients had changed their minds about PM (20%) with a further 7% failing to engage with the MDT process.
CONCLUSIONS: Our MDT follows NICE guidance and facilitated cross-specialty interrogation of requests for PM. It reduced the number unnecessary operations and helped justify decision-making for those patients who would derive maximum benefit. Following mastectomies, the patients are primarily concerned about cosmesis and hence the MDT should be plastic surgery led. This model could be replicated within any region seeing patients requesting PM.
Learning Objectives:
1. Participants will be able to value the why certain patients are offered risk reducing mastectomy; and
2. Participants will be able to compare how practices vary between the UK and Canada

13
THE IMPACT OF TRAM FLAP BREAST RECONSTRUCTION ON MORTALITY IN WOMEN WITH INVASIVE BREAST CANCER TREATED WITH MASTECTOMY

J Semple*, K Metcalfe, P Sun, S Narod
Toronto, ON

PURPOSE: Breast reconstruction is an option for women treated with mastectomy for breast cancer, however, there has been concern regarding the oncologic safety associated with reconstruction after an invasive breast cancer diagnosis. In the current study, the aim was to evaluate regional recurrences, distant recurrences, and mortality in women treated with mastectomy and to determine if there were any differences in any outcomes between those with mastectomy alone and those with autologous breast reconstruction.
METHODS: The prospective cohort study included women treated with mastectomy at Women's College Hospital from 1987 to 1997. Women with autologous breast reconstruction (cases) were matched to controls based on age of breast cancer diagnosis (+ 2 years), year of diagnosis (+ 2 years), stage, and nodal status. Patients were followed from the date of breast cancer diagnosis until death or date of last follow-up. Odds ratios were generated to compare cases and controls for outcome variables using conditional logistic regression.
RESULTS: Of 443 women with invasive breast cancer, 85 subjects had TRAM flap breast reconstruction. Sixty-five of these women were able to be matched with 115 controls based on matching criteria. There was a mean of 11.2 (0.4-26.3) years of follow-up. Women with TRAM flap were less likely to experience distant recurrence compared to women without TRAM (OR 0.35; p=0.02), and more likely to be alive (OR 0.45; p=0.05). The Kaplan-Meier breast cancer-specific survival estimates 25 years after invasive breast cancer diagnosis were 68.3% for cases with TRAM flap (95%CI:57.2%-79.7%) and 56.8% for controls (95%CI:41.9%-69.3%; p=0.13).
CONCLUSIONS: Women who elect for TRAM flap breast reconstruction after an invasive breast cancer diagnosis do not experience worse outcomes related to recurrences or survival compared to women with mastectomy alone.
Learning Objectives:
To identify influences of survival outcomes in breast cancer patients with breast reconstruction after mastectomy.

15
SINGLE-STAGE BREAST RECONSTRUCTION WITH SPECTRUM ADJUSTABLE EXPANDER/IMPLANT IN A REVIEW OF 124 IMPLANTS

A Azzi*, D Zammit, L Lessard
Montréal, QC

PURPOSE: Breast reconstruction using an implant-based approach frequently involves two-stage processes, requiring the insertion of a tissue expander. More recently with the addition of dermal matrix, single stage is gaining popularity. We aimed to present the senior author's experience over a period of 12 years using Spectrum implants.
METHODS: Single-institution, retrospective review of breast reconstructions with Spectrum® implants from 2002-2014. Univariate and multivariate analyses were performed to evaluate the impact of 29 variables (patient-related, procedure-related, and cancer- related).
RESULTS: A total of 124 Spectrum® implants in 76 patients were included in this study. Mean follow up time was 81.7 months (SD± 39.2; 15-151 months). Immediate reconstruction was performed in 66% of cases. Complication rates were as follows: 0.8% extrusion, 21.8% contracture (Grade I to IV), 7.3% minor infection, 2.4% dehiscence, 17.7% deflation, 1.6% mastectomy flap necrosis, 2.4% migration, 3.2% seroma, and 1.5% hematoma. History of radiotherapy was associated with a higher rate of infection (p=0.014) and dehiscence (p=0.023). Multivariate analysis also identified the following associations: adjuvant radiotherapy and capsular contracture (p=0.008), immediate reconstruction and hematoma (p=0.049), and smoking history and infection (p<0.001). Overall, 79.8% of reconstructions were achieved using a single stage.
CONCLUSIONS: Health care resources are costly and should be used judiciously, now more than ever. Single stage reconstruction using all in one expander/implants (Spectrum®) eliminates the need for a second procedure under general anesthesia and can achieve adequate results. This study aims to contribute to the breast reconstruction armamentarium using a single-staged expander/implant with a 79.8% success rate.
Learning objectives:
The participants will learn about the advantages and complications of a single-staged breast reconstruction using a single expander/implant (Spectrum). They will also learn to identify good candidates for this type of reconstruction based on predictors of complications.

CANADIAN EXPERT

15A
NERVE TRANSFERS

S Bristol
Vancouver, BC

Learning Objectives:
1. Basic principles of nerve transfer;
2. Generally accepted uses of nerve transfer reconstruction; and
3. New/innovative uses and potential uses for nerve transfer.

TIPS AND PEARLS

TP01
KEEPING THE NIPPLES ALIVE: THE ROLE FOR NIPPLE DELAY

PJ Rasmussen, N Humphreys, J Williams*
Halifax, NS

Nipple-sparing mastectomy has become increasingly common, but carries a risk of nipple- areolar complex necrosis. We describe a new protocol at our institution that utilizes a nipple delay and subareolar biopsy procedure under local anesthetic, performed three weeks before mastectomy, to improve nipple viability and diagnostic accuracy of biopsy results.

TP02

TIPS FOR EFFICIENT AND PRODUCTIVE RESEARCH DURING RESIDENCY

C White*, A Thoma
Victoria, BC

Learning to conduct research and publish efficiently is not something that is inherently obvious. By stressing organization, a balanced research profile, collaboration and templates are ways in that residents can publish efficiently. These are some of the simple but effective ways that research during residency has been integrated in the McMaster Plastic Surgery training program.

TP03

HOW MANY TRIGGER FINGERS GET BETTER WITHOUT TREATMENT?

D Lalonde*, J Lalonde
Saint John, NB

INTRODUCTION: Many of the patients we call to give a surgery date tell us their problem is resolved. Our long surgical waiting lists for this type of procedure provide us with significant numbers of patients who do get better before we can operate on them. It is important that surgeons know how many patients might get better in a given time period if they have no treatment. There is very little information in the literature about the natural history of untreated trigger fingers.

MATERIALS & METHODS: We looked at all of our trigger finger waiting lists both prospectively and retrospectively from the years 2004 to 2015. We documented how long it took between booking the patients for surgery and offering them a surgical date on the telephone. In addition to demographic data, we recorded which digits were involved and how many patients declined surgery because their problem had resolved without treatment.

RESULTS: At the time of consultation in our office, we booked 287 patients for trigger finger release between 2004 and 2015. When we called them months after their consultation to offer them a surgical date, 141 of those patients accepted a surgical date and came for surgery. The other 146 of those patients declined to have surgery because their symptoms had improved without treatment. The average waiting time between consultation and surgical date offer in those patients who had surgery was 5.7 months in women and 7.7 months in men. The average waiting time between consultation and surgical date offer in those patients who did not need surgery was 7.3 months in women and months in 8.6 in men.

CONCLUSIONS: We found that approximately half of patients who have to wait over 6 months for trigger finger surgery get better without any intervention.

TP04

SIMPLIFYING THE CORRECTION OF THE SADDLE NOSE DEFORMITY

IR Sunderland
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The saddle nose deformity represents one of the greatest challenges in rhinoplasty. A novel, 3-step surgical approach to saddle nose correction will be presented which utilizes allograft cartilage and a diced cartilage-in- fascia dorsal augmentation. The procedure is technically straightforward, has no donor site morbidity, and avoids problems seen with rigid dorsal grafts.

TP05

WHERE THE STRAIGHT LINE MEETS THE CURVE AND WHERE THE TRIANGLE GOES? PLACING CUPID'S BOW PEAK AND OPTIMIZING CUTANEOUS ROLL AESTHETICS IN THE ANATOMICAL SUBUNIT REPAIR OF CLEFT LIP.

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To improve the symmetry of Cupid's bow, Millard modified his rotation-advancement repair to incorporate a small laterally based triangular flap at the cutaneous roll. Several modifications of this flap were published since. The authors present this pearl in positioning both the peak point and triangular flap for optimum balanced results.

16

LATERAL INFRAMAMMARY FOLD INCISION VERSUS FULL INFRAMAMMARY FOLD INCISION IN NIPPLE-SPARING MASTECTOMIES: A LITERATURE REVIEW

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PURPOSE: Nipple loss, cancer recurrence and patient satisfaction remain a challenge in breast reconstruction following nipple-sparing mastectomy. A systematic review was conducted to assess whether sufficient evidence is available in the literature to recommend utilizing the lateral IMF incision in nipple-sparing mastectomy.

METHODS: Pubmed, Ovid, Embase and Scopus electronic databases were searched over the period of 1970 to 2016. Keywords used were "nipple sparing mastectomy" or "nipple- sparing mastectomy" and "inframammary" or "infra-mammary". Two independent reviewers performed a two-step review process against the following criteria: (1) Therapeutic or Prophylactic mastectomy (2) Alloplastic reconstruction (3) reported radiation rate (4) reported smoking rate (5) reported mean BMI (6) reported rate of nipple loss and cancer recurrence (7) articles published in English (8) articles including more than 10 patients. Sample size, population irradiated, smoker's rate, obesity rate, degree of ptosis, rate of nipple loss and cancer recurrence were extracted. Each article's methodological quality was assessed independently. The weighted average was calculated to assess the overall nipple loss and cancer recurrence rate. Due to the diversity of scales measuring the degree of satisfaction for the lateral IMF NSM, degree of satisfaction among patients following lateral IMF incision NSM in our institute was reported using the Breast Q scale.

RESULTS: Eight studies with a total of 532 patients examined the use of lateral IMF incision NSM. The overall rate of nipple loss and cancer recurrence was 4.9 % and 1.3 % respectively. Four studies with a total of 877 patients examined the use of full length incision NSM. The overall rate of nipple loss and cancer recurrence was 7.8 % and 1.6 % respectively. Four patients reported a score of 56.5 satisfaction with the breast, 78.5 satisfaction with the outcome, 85.25 psychosocial well-being and 81.75 physical well-being according the Breast Q scale.

CONCLUSION: The results show that lateral IMF incision may have a potential benefit of reducing nipple necrosis with no increase in rate of cancer recurrence and a fair degree of satisfaction. However, RCTs are needed to establish a recommendation to utilize the lateral IMF incision for NSM as a standard incision.

Learning Objectives:
Participants will recognize the advantages and disadvantages of two commonly used types of incision in NSM.

17

IS THERE A PREFERABLE MATCHING OF ACELLULAR DERMAL MATRIX WITH BREAST IMPLANTS: A COMPARATIVE ELECTRON MICROSCOPY SCANNING OF TWO DIFFERENT IMPLANT-MATRIX INTERFACES.

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PURPOSE: We intend to characterize the ultrastructure at the interface between the Alloderm® acellular dermal matrix and two textured tissue expanders (Allergan BIOCELL® and Mentor SILTEX®) using scanning electron microscopy (SEM).

METHODS: Capsule specimens were obtained from 10 patients who underwent a two stages breast reconstruction with Alloderm® from which 5 had an Allergan Biocell® expander (Group 1) and 5 had a Mentor Siltex® expander (Group 2). For each patient, 2 periprosthetic capsule specimens (1 cm2) were sampled 'en-bloc' during implant exchange: one at the junction between Alloderm® and the pectoralis major muscle and the other at the site of Alloderm®. All specimens were analyzed under SEM using High Vacuum modes and Energy dispersive X-ray conditions. Specimens were characterized for texture/cellularity, presence of biofilm and bacteria level using image- processing software with a 2% margin of error.

RESULTS: Group 1: no macro texture ingrowth of the capsule on the pores of the textured implants (Velcro-effect) was observed at the implant-matrix interface. There was a strong bacterial colonization of the implant porous surface, with presence of biofilm in 3 out of 10 specimens. Group 2: a smooth capsule surface without any Velcro effect was observed with lesser bacterial colonization and no biofilm development.
CONCLUSION: The lack of Velcro-effect between the Biocell® implant and the Alloderm® (Group 1) may have facilitated bacterial seeding, propagation and the formation of a biofilm.
Learning Objectives:
These findings can help guide clinical decision making when selecting the most optimal implant surface with an acellular dermal matrix in order to minimize long-term complications.

18
ANALYSIS OF CRANIOFACIAL REMODELLING IN THE AGING MID-FACE USING RECONSTRUCTED 3D MODELS IN PAIRED-INDIVIDUALS

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PURPOSE: Aging leads to a panoply of changes of the facial morphology. Existing studies evaluating the bony changes of the mid-face, have used low resolution imaging and failed to eliminate the inter-individual variability. The present study was conducted to analyze modifications of the facial skeleton with aging, using high resolution imaging and comparing the same individuals at a two time points.
METHODS: The electronic medical record system was reviewed since its inception in 2001 for patients that underwent two computed tomography (CT) scans of the mid-face at least ten years apart. The CT scans were converted into 3D craniofacial models for each patient, using the initial and late CT-scan data. The models highlighted areas of bone growth and bone resorption using a color scale.
RESULTS: Seven patients with a mean age of 61 years and CT scans on average 10.1 years apart were included. Bone resorption was consistently present (100%) at the pyriform aperture and the anterior wall of the maxilla. Resorption was noted at the supero-central (71%), infero-lateral (57%) and supero-medial (57%) aspects of the orbital rim. There was a dichotomous relationship at the orbital rim with resorption occurring earlier at the infero-lateral orbital rim followed by the supero-medial orbital rim at later decades of life.
CONCLUSIONS: Bone remodelling in the same individual, over a period of 10 years, was characterized primarily by resorption and was present at the pyriform aperture, anterior wall of maxilla, and the supero-central, supero-medial and infero-lateral aspects of the orbital rims.
Learning Objectives:
1. Participants will be able to list the areas of bony resorption on the facial skeleton with aging; and
2. Participants will be able to apply mid-facial rejuvenation techniques based on the changes of the bony facial skeleton.

AW FARMER LECTURE

0019
BREAST IMPLANT ASSOCIATED ALCL: ETIOLOGY, EPIDEMIOLOGY, AND OUTCOMES

M Clemens
Houston, Texas

Learning Objectives:
1. Participants will be able to clearly define by diagnostic criteria what is breast implant associated ALCL;
2. Participants will be able to describe most prevailing theories on etiology and modifiable surgical techniques to address these; and
3. Participants will be able to describe optimal treatment strategies and outcomes based upon evidence based standard of care.

EYE OPENER

019
PEARLS AND THORNS EARNED DURING THE JOURNEY THROUGH FOUR DECADES OF RECONSTRUCTIVE SURGERY AND THE 'ART OF GIVEING BACK' TO THE COMMUNITY

A Gupta
Mumbai, India

Long ago, when I was discussing the possibilities for free surgery sessions with one of my senior professional colleagues, he explained to me in very simple words the difference between possessing something and giving back something. He'd said:

> You are not known for what you possess but you are known for what you give back to the community. There are seven colors and if you absorb all colors and you don't give back any color, you are known as 'Black', and if you don't keep anything for yourself and you reflect all colors back to the community, then you are known as 'White', and if you absorb all other colors and reflect only red, you are known as 'Red'. It is by what you give back, that you are known.

Learning Objectives:
1. Undertaking difficult/innovative microsurgical reconstruction even under odd conditions and to provide due care even to the under-privileged group of people wherein there is no National Health Cover;
2. Maintain a good long term follow up to learn/overcome some of the omissions/mistake you might have not realized during the execution of the surgery;
3. Reaching out to the community and gain their confidence that YES, WE CAN MAKE A DIFFERENCE. We are those fortunate, who go home knowing that we can make a difference in the community;
4. MICROSURGERY has proved a 'panacea' for a large number of surgical problems, for which there were no alternative earlier.

19
THE EFFECT OF WRITTEN INFORMATION ON MEMORY OF SURGICAL RISKS FROM THE INFORMED CONSENT DISCUSSION: A RANDOMIZED CONTROL TRIAL

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PURPOSE: Informed consent is a key component of patient education and perceived lapses in the process account for 70% of malpractice lawsuits. The effect of written information on memory of surgical risks has not been assessed for carpal tunnel release, a common procedure with the rare but serious complication of complex regional pain syndrome (CRPS). It was hypothesized that providing written information would improve patients' ability to remember the risks of surgery.
METHODS: This was a prospective single-blind randomized study of 50 consecutive patients seen for open carpal tunnel release. All patients received an informed consent discussion of the risks of surgery using a standardized script, and half also received a written pamphlet of the same information. Two weeks following the initial consultation, each patient was contacted to assess their recall of the risks and whether they had read about the surgery.
RESULTS: There was no difference between pamphlet or control in total risk recall (1.13±1.18 vs. 1.42±1.22, $P > 0.05$) or specific risks ($P > 0.05$). No patients in either group remembered CRPS. There was no effect of demographics on risk recall. There was no difference in the number of people who read about the surgery between groups (38.1% vs. 26.8%, $P = 0.47$), but reading was positively correlated with improved recall (2.25±1.29 vs. 0.71±0.01, $P < 0.01$).
CONCLUSIONS: Reading about surgery improved risk recall, but simply providing this information in the form of a pamphlet did not, nor did it affect memory of CRPS. These results show that surgeons should implement additional measures to improve memory and comprehension of surgical risks and encourage patients to inform themselves about their surgery.
Learning Objectives:
Understand the factors that affect informed consent. Be able to describe strategies for improving risk recall beyond written information.

20
ELECTRICAL STIMULATION ENHANCES MUSCLE REINNERVATION AND FUNCTIONAL RECOVERY FOLLOWING CUBITAL TUNNEL SURGERY – A RANDOMIZED CONTROLLED TRIAL

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BACKGROUND: Patients with severe cubital tunnel syndrome often have poor functional recovery with conventional surgical treatment. Post-surgical electrical stimulation (ES) enhances motor and sensory axonal regeneration in humans following carpal tunnel release and repair of digital nerve transection. In this study, we investigated the hypothesis that ES following cubital tunnel surgery in patients with severe ulnar neuropathy would result in better muscle reinnervation and functional recovery compared to surgery alone.

METHODS: Patients with severe axonal loss from ulnar nerve compression at the elbow were randomized in a 2:1 ratio to the stimulation or control groups. Control patients received cubital tunnel surgery alone, while patients in the stimulation group received 1 hour of 20Hz ES following surgery via two electrodes implanted intraoperatively. Patients were followed yearly for 3 years. Muscle reinnervation was quantified using motor unit number estimation (MUNE) and functional recovery was evaluated using grip and key pinch strength. Non-parametric statistics were used with significance set at $p<0.05$.

RESULTS: Twenty-four patients were enrolled with 8 receiving surgery alone and 16 receiving surgery and ES. Patient characteristics were similar between groups. Three years following surgery, MUNE was significantly higher in the ES group (176±23, mean+SE) compared to controls (88±11, $p<0.05$). Grip strength was significantly improved in the treatment group (43±3kg) at 3 years post-operatively compared to controls (39±3kg, $p<0.05$). Key pinch strength was also significantly better in the treatment group (5.2±0.5 kg) compared to controls (4.4±0.8kg, $p<0.05$).

CONCLUSIONS: Our results suggest that post-surgical ES enhances axonal regeneration, muscle reinnervation and functional recovery following cubital tunnel surgery in humans. We propose that ES may be a clinically useful adjunct to surgical decompression for severe ulnar neuropathy, where functional recovery with conventional treatment is poor.

Learning Objective:

To learn about a novel method to enhance peripheral nerve regeneration in humans.

21
COMPUTED TOMOGRAPHY ANALYSIS OF ULNAR CARPOMETACARPAL FRACTURES IDENTIFIES INJURIES MISSED ON PLAIN FILM RADIOGRAPHS AND SIGNIFICANTLY CHANGES MANAGEMENT

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PURPOSE: Ulnar carpometacarpal (CMC) fractures are commonly assessed with plain film radiography, which is challenging due to overlapping bony architecture on lateral views. Computed tomography (CT) images are not routinely performed in pre-operative analysis, but do offer accurate assessment of the CMC joint. The purpose of our study was to identify clinically significant differences in fracture analysis using CT compared to plain films, and to identify changes in proposed fracture management.

METHODS: Fourteen consecutive patients in a single surgeon's practice with ulnar CMC fractures were included. Two fellowship-trained academic hand surgeons, two hand surgery fellows, and two senior residents independently assessed three standard radiographic views as well as CT images. Images were assessed in a blinded fashion for the following parameters: metacarpal injured, associated carpal fracture, and articular step >2mm. Reviewers selected a management plan for each fracture.

RESULTS: On plain film analysis, reviewers misidentified which metacarpal was injured in 19% of patients. 36% of associated carpal fractures were missed. Reviewers failed to identify an intra-articular fracture in 23% of patients. A step deformity was incorrectly estimated in 50% of patients when using plain films alone. CT imaging changed fracture management in 49% of patients.

CONCLUSIONS: CT imaging increases diagnostic accuracy in the evaluation of ulnar CMC fractures, and information provided by CT scan imaging leads to significant differences in management. Acquiring CT scan imaging may significantly contribute to optimal management of these injuries.

Learning Objectives:

Following this presentation participants will be able to list features of ulnar CMC fractures that are frequently missed on plain film evaluation. Participants will be able to compare the accuracy of plain film and CT imaging in ulnar CMC fractures, and will understand advantages of CT imaging in diagnostic accuracy and treatment planning.

22
THE EFFECT OF ELECTRICAL STIMULATION ON COLD SENSITIVITY AFTER DIGITAL NERVE INJURY: A RANDOMISED CONTROLLED TRIAL

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PURPOSE: Cold hypersensitivity and intolerance are debilitating consequences following digital lacerations involving repair of neurovascular structures. In fact, long-term studies show that cold sensitivity may be the most sustained symptom and serious complaint following digital replantation. The etiology of this symptom is multifactorial, ranging from decreased thermoregulatory vascular rewarming to disproportionate re-innervation of cold-receptor free nerve endings. Multiple studies have shown that brief post-surgical electrical stimulation (ES) accelerates peripheral sensory and motor nerve regeneration. However, the effect that this treatment has on cold sensitivity after nerve repair has yet to be published. The purpose of this study is to test the hypothesis that ES after complete digital nerve transection injury and repair will improve cold sensitivity recovery compared to surgery alone.

METHODS: Patients with complete digital nerve transection underwent epinerial nerve repair. After coaptation of severed nerve ends, fine wire electrodes were implanted before skin closure. Post-operatively, patients were randomized to either receive 1h of 20Hz continuous ES or sham stimulation in a double-blinded manner. Patients were followed monthly for 6 months by a blinded evaluator to monitor quantitative cold determination threshold (CDT) testing and a short modified cold intolerance symptom severity questionnaire.

RESULTS: A total of 36 patients were recruited with 18 in each group. Those in the ES group showed recovery advantage by 5 to 6 months post-operatively based on CDT ($p=0.020$). Modified cold intolerance symptom score comparison also showed improved cold intolerance in the ES group compared to controls ($p=0.34$).

CONCLUSIONS: Physiologic and subjective results support improved cold stimulation sensitivity after nerve injury and repair when ES treatment is provided.

Learning Objectives:

Attendees will be provided:

1. A brief overview regarding the multifactorial etiology of cold hypersensitivity after nerve injury; and

2. A summary of novel methods of quantitative cold sensitivity testing and qualitative cold sensitivity scoring.

23
MEDIAL FEMORAL CONDYLE FLAP FOR BONE GRAFTING OF SCAPHOID NON-UNION: A CAUTIONARY TALE

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PURPOSE: Scaphoid non-union is a significant complication of scaphoid fractures. A free vascularized medial femoral condyle flap (MFCF) has been described as the treatment for a scaphoid non-union with proximal pole avascular necrosis and a humpback deformity. The MFCF success rates have been reported at 85-100%. The purpose of this study was to evaluate factors affecting the success of treating scaphoid non-unions with a MFCF at our institution.

METHODS: From January 2011 through October 2011, 6 patients with scaphoid non- unions were treated with medial femoral condyle flaps. A retrospective review of the clinical and radiographic data was performed. Five males and one female patient with an average age 29 years (range: 18-37) were followed for an average of 13 months (range 3-34). One patient was lost to follow-up after evidence of delayed union.
RESULTS: Six patients underwent a MFCF for a scaphoid non-union an average of 3.55 years from injury (range 1.75-5 years). Three scaphoid non-unions were united at an average of 14 weeks after surgery. Persistent scaphoid non-unions occurred in 3 patients, necessitating additional surgery in 2 patients. Concurrent tobacco use was identified in 4 patients. All scaphoid non-unions occurred in those that smoked. All anastomoses were patent at final follow-up; however, one of the patients with a non- union developed heterotrophic ossification along the pedicle necessitating additional surgery. There were no additional complications.
CONCLUSIONS: Although medial femoral condyle flaps have shown to be efficacious in the treatment of scaphoid non-unions, our study demonstrates that successful outcomes are not universal and may depend on careful patient selection and factors including tobacco use and duration of injury to surgery.
Learning Objectives:
At the end of this presentation, participants will be able to describe treatment options for scaphoid non-union and appreciate factors affecting medial femoral condyle flap success in scaphoid non-unions.

24
RETROSPECTIVE ANALYSIS OF OUTCOMES AFTER OFF-LABEL USE OF COLLAGENASE CLOSTRIDIUM HISTOLITICUM (XIAFLEX®) FOR DUPUYTREN'S CONTRACTURE.

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PURPOSE: Injection of palmar cords with collagenase clostridium histoliticum (Xiaflex®, Actelion Pharmaceuticals ltd) is a novel, non-surgical, treatment option for Dupuytren's disease. Health Canada currently recommends performing no more than two injections per treatment session, with 0.58mg of enzyme per injection. The lead author (SC) routinely performs multiple (>3) injections with up to 2.7mg per treatment session. The purpose of the present study was to review the outcomes associated with this, off-label, use of Xiaflex®.
METHOD: We performed a retrospective chart review of all patients with Dupuytren's treated with Xiaflex® by the lead author. The primary outcome was pre and post treatment contracture, and adverse events including pain, erythema, swelling, skin splits, and lymphadenopathy were recorded.
RESULTS: All 55 patients were treated with Xiaflex® were included. All of these patients had more than two injections per treatment session: 1-4 (median 2) joints were treated, with a mean of 5 (SD = 1.91) injection sites per session. Total contracture per hand was significantly reduced by 93.8% from 78.9 (SD 51.32) degrees to 4.9 (SD = 9.2) degrees (t= 11.78, p<0.005) post treatment. The most common adverse events reported were ecchymosis, swelling, and pain, which were reported in 85, 80, and 25% of patients respectively. Skin splits occurred in 19 patients (34.5%). There was no incidence of tendon rupture.
DISCUSSION: Our data suggest that using Xiaflex® to inject multiple sites per hand is safe and effective. Improvement in contracture using this off-label technique was greater than previously reported in two large randomized control trials (CORDI and CORDII). There is, however, an increase in adverse events including skin splits relative to previous reports.
Learning Objectives:
1. Participants will be familiar with current guidelines for use of Xiaflex® in Dupuytren's disease; and
2. Participants will be familiar with the outcomes after off-label use of Xiaflex®.

25
ULNAR NERVE VERSUS HEMATOMA BLOCK FOR CLOSED REDUCTION OF BOXER'S FRACTURES

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PURPOSE: To date, there is no published literature comparing methods for providing analgesia during closed reduction of transverse fifth metacarpal neck fractures. This study aims to determine whether ulnar nerve or hematoma blocks provide better analgesia when performing closed reduction of Boxer's fractures.
METHODS: A prospective randomized controlled trial of 24 patients with isolated displaced fifth metacarpal neck fractures was conducted. Using sealed and coded envelopes, patients were randomly allocated to receive either ulnar nerve (n=12) or hematoma (n=12) blocks. 5cc of local anesthetic (9:1 mixture of 1% plain lidocaine and 8.4% sodium bicarbonate) was administered as an ulnar nerve or hematoma block. After 10 minutes, cutaneous anaesthesia over the fracture site was checked, injecting additional local anesthetic if needed. Closed reduction was then performed using Jahss' manoeuvre. Pain of injection and closed reduction were subsequently rated by patients using the NRS-11 pain scale.
RESULTS: There was no statistically significant difference in demographics or injury characteristics between experimental groups. The amount of local anesthetic needed to achieve anesthesia prior to reduction was not statistically different between ulnar nerve and hematoma block groups. Pain of injection was similar between groups. Patients experienced less pain during closed reduction following ulnar nerve blocks compared to hematoma blocks (4.33 vs. 6.83, p=0.03). One patient undergoing an ulnar nerve block had inadvertent arterial puncture that resolved without complication; however, there was no statistically significant difference in total complication rates between block groups.
CONCLUSIONS: Ulnar nerve blocks provide better analgesia than hematoma blocks for closed reduction of Boxer's fractures. The two blocks are comparable in terms of patient discomfort during injection, total volume of local anesthetic required, and complication rates.
Learning Objectives:
1. Participants will be able to identify which method of local anesthesia provides better analgesia for patients undergoing closed reduction of Boxer's fractures.

26
COST ANALYSIS OF PERCUTANEOUS FIXATION OF HAND FRACTURES IN THE MAIN OPERATING ROOM VERSUS THE AMBULATORY SETTING

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PURPOSE: To date, there have been no studies identifying the cost differential for performing closed reduction internal fixation (CRIF) of hand fractures in the operating room (OR) versus an outpatient clinic setting. Our goal was to analyze the cost and efficiency of performing CRIF in these two settings and to investigate current practice trends in Canada.
METHODS: A detailed analysis of the costs involved both directly and indirectly in the CRIF of a hand fracture was conducted. Hospital statistical records were used to calculate efficiency. A survey was distributed to practicing plastic surgeons across Canada regarding their current practice of managing hand fractures.
RESULTS: In an eight-hour surgical block we are able to perform approximately five CRIF in the OR versus eight in an ambulatory setting. The costs of performing a CRIF in the OR under local anaesthetic, not including surgeon compensation, is $461.27 Canadian (CAD) compared to$115.59 CAD in the ambulatory setting, a 299% increase. The use of a regional block increases the cost to $665.49 CAD, a 476% increase. The main barrier to performing CRIFs in an outpatient setting is the absence of equipment necessary to perform these cases effectively, based on survey results.
CONCLUSION: The use of the OR for CRIF of hand fractures is associated with a significant increase in cost and hospital resources with decreased efficiency. We conclude that for appropriately selected hand fractures, CRIF in an ambulatory setting is less costly and more efficient compared to the OR and resources should be allocated to facilitate CRIF in this setting.

Learning Objectives:
To understand the cost and efficiency difference between performing CRIF in the OR versus outpatient setting and to appreciate current practice trends and barriers to performing CRIFs in an ambulatory setting.

27
SAFETY OF TREATING METACARPAL FRACTURES IN MINOR SURGERY

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PURPOSE: The standard of care at most institutions is for metacarpal fractures to be treated in the main operating room under a general anaesthetic with reported complication rates as high as 33%. At our institution, these injuries are routinely treated in the minor surgery setting under local anaesthetic. We designed this study to look at complication rates of open reduction, internal fixation (ORIF) for metacarpal fractures in minor surgery and see whether they were equal to or lower than that of reported rates for the main OR.
METHOD: Charts were reviewed for patients treated by a single surgeon since 2010. All patient records matching billing codes for metacarpal fractures were examined. Those patients that had undergone surgical treatment of a metacarpal fracture in the minor surgery setting were examined. Data points extracted included: number of follow-up visits, length of follow-up, complications, type of fixation, and end of treatment function. No pre- operative antibiotics were administered.
RESULTS: 28 patients were identified. Average age at surgery was 35. Fixation systems employed varied between 5 hole and 6 hole plates or lag screws in 1 case. Mean operative time was 62.2 minutes (30-108 minutes). Mean number of follow-up visits was 1.08 (0-3). One patient developed adhesions and after tenolysis went on to obtain acceptable function. All patients were pain free and had full range of motion at their final follow-up visit.
CONCLUSIONS: Our complication rate of 3.5% is lower than reported figures. The only complication experienced was tendon adhesions. No infections were reported. Minor surgery is a safe alternative to main OR for treatment of metacarpal fractures.
Learning Objectives:
1. Understand minor surgery is safe for treatment of metacarpal fractures;
2. Recognize complication rates are low when metacarpal fractures are treated in minor surgery.

28
AN ENHANCED RECOVERY AFTER SURGERY PATHWAY FOR AUTOLOGOUS BREAST RECONSTRUCTION DECREASES POSTOPERATIVE PAIN, NAUSEA, AND LENGTH OF HOSPITAL STAY

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PURPOSE: The aim of this study was to develop, implement, and evaluate an Enhanced Recovery After Surgery (ERAS) pathway in microsurgical autologous breast reconstruction using abdominal tissue.
METHOD: An ERAS pathway was developed with key features including: shortened preoperative fasting, judicious fluids, multimodal analgesics, early oral nutrition, early Foley catheter removal, and early ambulation. Consecutive cases from all breast reconstruction surgeons at a single institution were included. There were three patient cohorts: 1. Traditional Recovery After Surgery (TRAS) historical control, 2. Transition Group (TG) with partial implementation, and 3. ERAS. Narcotic use, antiemetic use, hospital length of stay, and thirty day postoperative complications were assessed.
RESULTS: There were 169 patients in the TRAS, 89 in the TG, and 40 in the ERAS cohort. Total narcotics required was significantly less in the ERAS group (TRAS 157mg, TG 84mg, ERAS 50mg, $p<0.01$). The amount of antiemetics used was lower in the ERAS cohort (TRAS 6 doses, TG 4 doses, ERAS 2 doses, $p<0.05$). Length of hospital stay was reduced by 2 days in the ERAS group (TRAS 6.6 days, TG 5.6 days, ERAS 4.5 days, $p<0.01$). Rates of major complications were not different between groups (TRAS 5.9%, TG 5.6%, ERAS 2.5%, $p>0.05$).
CONCLUSIONS: Patients in the ERAS group had less postoperative pain and nausea as measured by lower use of narcotics and antiemetics. Further, ERAS patients had a significantly shorter length of hospital stay without an increase in the rate of major complications thirty days postoperatively.
Learning Objective:
Participants will be able to explain the benefits of using an ERAS pathway for perioperative management of patients undergoing free autologous breast reconstruction using abdominal tissue.

29
RISK-REDUCING MASTECTOMY AND IMMEDIATE BREAST RECONSTRUCTION IN THE BRCA+ PATIENT: IS THE WAIT TIME TOO LONG?

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PURPOSE: To examine wait times for BRCA mutation carriers undergoing risk reducing mastectomy (RRM) and immediate breast reconstruction. We hypothesize that there is a clinically significant rate of breast cancer occurrence in British Columbian patients during wait-time for RRM with immediate reconstruction.
METHODS: A retrospective review of BRCA1/2 mutation carriers identified by the British Columbia Cancer Agency (BCCA) between 2000 and 2012 was performed. Patients were identified through the BCCA Hereditary Cancer Program. Patients with a breast cancer diagnosis at the time of genetic testing were excluded. Charts were reviewed for demographic information, breast cancer risk factors, specialist consultation dates, surgical dates, reconstructive details, and surgical pathology.
RESULTS: A total of 1137 patients were identified as BRCA1/2 mutation carriers by BCCA from 2000 to 2012. 553 patients with a pre-existing cancer diagnosis at time of BRCA mutation identification were excluded. 64 women of the remaining 584 patients were diagnosed with cancer after their BRCA mutation was identified. Wait-time data was analysed to confirm the rate of cancer development whilst waiting for risk reducing surgery.
CONCLUSION: BRCA positive patients experience long delays while waiting for risk reducing mastectomy and immediate breast reconstruction. This is the first study to examine breast cancer development in women waiting for RRM with immediate reconstruction. This study emphasizes the need for increased prioritization of prophylactic breast surgery.
Learning Objectives:
Participants will be able to:
1. Understand importance of timely access to risk-reducing mastectomy and immediate reconstruction;
2. Understand wait times for RRM with immediate reconstruction for BRCA+ patients in British Columbia; and
3. Describe risk for women developing breast cancer while waiting for prophylactic surgery.

30
PATIENT-REPORTED OUTCOMES FOLLOWING ABDOMINAL BASED BREAST RECONSTRUCTION: IMPLICATIONS FOR PRE-OPERATIVE PATIENT EDUCATION

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PURPOSE: Before undergoing any surgical procedure, it is important for the patient to have a clear understanding of the post-operative recovery process. Breast microsurgeons commonly quote recovery periods of ?a few months? following abdominal based breast reconstruction. As there is little evidence on patient perceived recovery post-operatively, we aimed to assess the patient experience and perceived deficits following abdominal based breast reconstruction.
METHODS: This study included 85 patients undergoing abdominal based breast reconstruction with an SIEA (24), DIEP (56) and SIEA/DIEP (5). All women completed a series of validated questionnaires pre-operatively and 12 months post-operatively to assess psychosocial and physical well- being.
RESULTS: Across groups there is a statistically significant decrease in the severity of anxiety from pre-op to 12 months post-operative. Patient

reported perceptions of their physical well-being significantly decreased from pre-op to 12 months post-op, p = 0.0001. When reporting on elements of their care, patients reported the lowest satisfaction for information they received pertaining to their surgical course.
CONCLUSIONS: There does appear to be a positive effect of abdominal based breast reconstruction in patients psychosocial well-being, specifically a decrease in severity of anxiety. Perceived physical well- being appears to be impaired for a prolonged period with deficits still perceived at one year out. This study suggests a prolonged perception of impaired well-being may occur in a significant number of patients. Plastic surgeons may need to provide more information regarding the extent of total recovery.
Learning Objectives:
To learn about the prolonged period of impaired physical well-being reported by patients after abdominal based breast reconstruction and the implications this has on pre-operative patient education.

31
BREAST RECONSTRUCTION IN CANCER PATIENTS UTILIZING OMENTAL FLAPS? A REVIEW OF THE LITERATURE AND AN OUTCOME-BASED ANALYSIS

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PURPOSE: The evidence on use of Omental Flaps for breast reconstruction in patients with breast cancer is lacking, and no published reviews report an outcome based assessment of such flap. This review aims to explore available data and evidence for change in complication rates following the shift towards laparoscopic harvesting.
METHODS: We searched databases EMBASE, Medline, and PubMed from inception until December 2014 using search terms 'Omental Flaps' and 'Breast Reconstruction' or their synonyms. Data extracted were patient characteristics, technique used, and outcome measures reported. Descriptive analysis was done contrasting laparotomy with laparoscopic technique of harvesting with regards to complications, advantages and disadvantage.
RESULTS: Twenty-one articles reporting 627 patients who underwent mastectomies and breast conserving surgeries were included in this review. Most flaps (81.8%) were harvested using a laparotomy approach, and 96.0% of flaps were pedicled. The mean age was 48 years and mean follow-up was 39 months. There were 81 reported complications among 562 patients in 15 reports. The rate of complications was higher in the laparotomy group (29.1%) in comparison to the laparoscopy group (11.8%). The most common complication was postoperative breast firmness that was reported in (2.31 %). While difficulty was estimating Omental volume before surgery, most authors reported flap malleability and excellent aesthetic outcome as the main advantages of the flap.
CONCLUSION: Use of Omentum is safe and has many advantages in breast reconstruction including a natural feeling and appearance of breast with minimal donor site morbidity when harvested laparoscopically. It is suggested to be an excellent option in certain cases where the workhorse flaps are inaccessible, or to meet particular patients preferences.
Learning Objectives:
Learners will be able to describe normal vascular anatomy of omental flaps. They will also know general benefits of such flaps when used in non- breast locations.

32
HOW SOCIAL ARE WE BEING? A CROSS SECTIONAL STUDY OF THE INTERNET AND SOCIAL MEDIA PRESENCE OF CANADIAN PLASTIC SURGEONS

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PURPOSE: The Internet and social media are increasingly being used for education, communication, and self-promotion. Our objective was to determine the online presence and social media reach of Canadian Plastic Surgeons. A secondary aim was to determine if certification date (as a proxy for age) correlated with online presence.
METHODS: REB exemption and an up to date list of plastic surgeons registered with the RCPSC was obtained. A Google search of surgeons Internet and social media profiles (Facebook, Twitter, LinkedIn, Google+, and RateMDs) was performed from June to August of 2015.
RESULTS: Out of 631 plastic surgeons in Canada, 42% had a personal or group website. The average years in practice for those having a website presence was 12.8 versus 21.9 for those without (p<0.0001). 85% of plastic surgeons had at least one social media profile. The average years in practice for this group was 19.4 versus 27.7 years for those with no profile (P<0.001). 7% were on all platforms studied while 57% were on no active platforms. The average years in practice between these groups was 16.2 versus 23.9 (p<0.002). The platform most found was RateMDs (80%) followed in descending order by LinkedIn (28%), RealSelf (22%), Facebook (20%), Google+ (17%) and Twitter (16%).
CONCLUSION: The majority of Canadian plastic surgeons did not have a website or active social media profile. Those that did were younger then their counterparts who did not. Plastic surgeons profiles were most likely found on the passive platform RateMD. This is notable in that surgeons not creating active accounts may still be online passively.
Learning Objectives:
1. Participants will learn the difference between active and passive social media; 2. Participants will learn how Canadian plastic surgeons are online and on social media.

33
BALANCING THE NEED FOR CLINICAL PHOTOGRAPHY WITH PATIENT PRIVACY ISSUES: THE SEARCH FOR A SECURE WAY TO TAKE AND STORE CLINICAL PHOTOGRAPHS

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PURPOSE: To evaluate a smart phone application for clinical photography that prioritizes and facilitates patient security.
METHOD: Ethics was obtained to trial a smart phone clinical photography application, PicSafe Medi©. Calgary plastic surgeons/residents used the application to obtain informed consent and photograph patients. Surveys gauging usability, consent process, and photograph storage/sharing using the application were then sent to surgeons and patients.
RESULTS: Over a six-month trial period, three Calgary plastic surgeons and 12 residents used the application to photograph 86 patients. Over half of patients (57%) completed the survey. The majority of patients (96%) were satisfied with the applications consent process and all felt their photograph was secure. The majority (93%) of surgeons/residents completed the survey. The application was felt to overcome issues with current photography practices: inadequate consent and storage of patient photographs by 100% of respondents, risk to patient confidentiality by 92% of respondents, and unsecure photograph sharing by 93% of respondents. Barriers to regular use of the application included need for cellphone service or Internet (54%), sanitary concerns due to the need for patients to sign directly on the phone (46%), inability to obtain proactive/retroactive consent (85%), and difficulty viewing photographs (80%). The majority of surgeons (85%) believe a smart phone application would be suitable to broadly implement for clinical patient photography, 15% prefer their smartphone camera, and none prefer a digital camera. Only 23% would use the application as is, but 62% would use it if modified.
CONCLUSIONS: A smart phone clinical photography application addresses the patient confidentiality risks of current photography methods; however, limitations of the trialed application prevent its broad implementation.
Learning Objectives:
Understand the role of a smart phone clinical photography application to enhance patient security

34
CONSTRUCTING SKIN GRAFT SEAMS IN BURN PATIENTS: A PROSPECTIVE RANDOMIZED DOUBLE BLINDED STUDY

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PURPOSE: At skin graft application, seams may be constructed either by approximating the graft edges (AP), or by overlapping the graft edges

(OV). It is not known if one technique produces a superior seam scar. The purpose of this study was to compare seam scars between seams constructed using the AP and OV techniques.

METHODS: This was a prospective study in adult burn patients treated at an ABA-verified burn center. At skin graft application, study seams were divided in half. By random assignment, one half of the seam was made by approximating the graft edges (AP group) while the other half was made by overlapping graft edges (OV group). At 3, 6, and 12 months post surgery, a blinded burn OT rated the two halves of each study seam scar using the Vancouver Scar Score (VSS). Patients were also blinded and rated each half of their study seam using a 0 (poor) to 10 (excellent) visual analogue scale (VAS).

RESULTS: There were 44 study seams among 19 subjects [age 51 (36-70) years, with % TBSA burn 10 (7-18)]. Study seams were constructed at 10 (4-15) days post burn. There were no significant differences in the either the total VSS score between AP and OV seams, or the individual VSS scores for height, pliability, vascularity, and pigmentation, at 3, 6, and 12 months. At 12 months, among the 30 study seams that were visible to the subjects, the VAS score for the AP seams was 9 (8.5-10) which did not differ significantly from the OV seams [9.5 (8.45-10), p=0.821].

CONCLUSIONS: There was no difference in the final seam scar quality between skin graft seams constructed using the AP or OV technique.

Learning Objectives:

Both the AP and OV techniques of seam construction lead to comparable scars, suggesting either technique is acceptable.

35

AVOIDABLE TRANSPORTATIONS: A 7 YEAR REVIEW OF TRANSFERS TO A REGIONAL BURN UNIT

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PURPOSE: The transport of thermally injured patients can involve significant costs, particularly in Ontario with a large catchment area requiring both land and air transportation. However, not all thermally injured patients necessitate transfer to a burn centre. The purpose of this study was to review transfers to an ABA verified regional burn centre to determine whether the transfers were avoidable, and the cost associated with transfers.

METHODS: A retrospective chart review identified patients transferred to an ABA verified regional burn center over a 7-year period. For the purposes of this study, "avoidable transportation" was defined as any patient admitted fewer than 7 days who did not undergo operative intervention during admission. Cost estimates for this study were calculated based on data from regional paramedic and critical-care transport services.

RESULTS: Of 708 patients identified who met inclusion criteria for the study, 193 (27.3%) were deemed avoidable transfers. The cost associated with avoidable transfers was approximately $227,396.93, or 18.7% of total transfer costs during the 7-year study. Average avoidable transport cost varied by method of transport: Ambulance (n=130) $285.72, Helicopter (n=27) $4136.34, and Airplane (n=15) $4,908.67.

CONCLUSIONS: The transfer of thermally injured patients is associated with significant cost. Avoidable transfers represent an inefficient use of a limited resource in an already strained healthcare system. In light of that, 27.3% of transfers were identified as avoidable, consuming 18.7% of total transportation costs. Thus, further initiatives should be explored to ensure the appropriate transfer of thermally injured patients in Ontario.

Learning Objectives:

At the end of this presentation, participants will be able to:

1. Value the cost associated with transfer of critically-injured patients; and

2. Consider alternative outreach initiatives to reduce avoidable transportations in all areas of medicine.

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BIODEGRADABLE SPHERICAL GRANULES FOR BONE HEALING OF CRITICAL-SIZE CRANIAL DEFECTS IN GROWING RABBITS

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PURPOSE: Cranial defects in the pediatric population are a complex reconstructive problem due to the growing calvarium. Currently, autologous bone grafts are the gold-standard treatment but are in limited supply in children. Biodegradable bone substitutes (Monetite) have been preclinically proven to repair defects in long bones. We hypothesize that Monetite could serve as ideal implant for cranial defects in children by stimulating bone repair while accommodating growth of the cranium.

METHODS: Critical size cranial defects were created in 9 young New Zealand white rabbits (n=9). We have divided them into three groups of three rabbits each. The initial group (control) had empty defects. The second group had their defects filled with high porosity monetite granules while the final group had a low porosity monetite construct. CT imaging and cephalometric analysis were performed pre- and post-operatively, and every month after surgery until sacrifice at two months. The effect of the treatment on cranial growth was assessed using cephalometry.

RESULTS: The control group demonstrated limited closure with persistent defects. Bony ingrowth improved in the high porosity group, despite its improvement, the low porosity group showed a higher rate of bony ingrowth both histologically and radiologically. We failed to statistically reject that all groups have the same change over time for all cephalometric variables (P-values were > 0.12), hence, no skull growth restriction.

CONCLUSION: Monetite granules increased the amount of bone deposition in critical size defects in growing rabbits. The porosity had a significant impact on bony ingrowth favoring low porosity constructs. There was no evidence of growth hinderance in the treatment group. This material may potentially serve as the ideal bone substitute, particularly in the pediatric population.

Learning Objectives:

Participants will be able to determine methods of cranial reconstruction along with recognizing an ideal bone substitute.

37

COMPARING OUTCOMES OF TITANIUM MESH TO CUSTOM POLY ETHERETHERKETONE(PEEK) IMPLANTS FOR CRANIAL VAULT RECONSTRUCTION

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PURPOSE: To comparing outcomes of Titanium Mesh to Custom poly etheretherketone(PEEK) implants for cranial vault reconstruction.

METHODS: A retrospective analysis was conducted of 58 patients who underwent cranial vault reconstruction by a single surgeon between 2012 and 2016. Patients under the age of 18 were excluded. Data was collected regarding medical comorbidities, initial indications for craniotomy, timing of reconstructive surgery, post-operative complications, need for reoperation, and aesthetic outcome.

RESULTS: Fifty-five patients met the study criteria. Indications for craniotomy were tumor ablation, hemorrhagic infarction, infection and trauma. Thirty-eight patients received titanium mesh implants and 17 patients had primary reconstruction done with a custom PEEK implant. Nine patients in the titanium cohort required revision for implant exposure or infection. No revisions were required in the PEEK cohort. Follow up ranged from 5 to 48 months. Complications varied from persistent edema/seroma to death with a rate of 45% in the titanium mesh group and 23% with PEEK. Post- operative aesthetics, as per a Likert scale, were predominantly rated as good in both groups, with a trend towards higher patient and clinician satisfaction in the PEEK cohort.

CONCLUSION: This is one of the largest case studies to date comparing titanium mesh to PEEK craniopalsty. Overall, complication rates for PEEK were low with a trend towards improved aesthetics.

Learning Objectives:

Participants will gain a better understanding of current materials and methods available for craniotomy reconstruction, including CAD/CAM design.

Participants will gain a better knowledge of common complications of cranioplasty and their incidence. Participants will gain a better understanding of indications for PEEK custom implants.

38
A PROSPECTIVE ANALYSIS OF ADHERENCE TO VIRTUAL SURGICAL PLANNING FOR ORTHOGNATHIC AND FREE FLAP CRANIOFACIAL SURGERIES

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PURPOSE: Refinements in operative and imaging techniques have allowed virtual surgical planning (VSP) to evolve into a useful tool for the craniofacial surgeon. The computerized plans can assist in orthognathic surgeries and reconstruction of the craniofacial skeleton. Despite increasing popularity, an underappreciation of the learning curve may yield unexpected challenges. This study aims to identify potential pitfalls to VSP and how to prepare beforehand.

METHOD: A prospective, single-surgeon, study of consecutive computer-assisted surgeries was performed from January 2013-2016. Inclusion criteria for analysis comprised patients of all ages with VSP for indications such as orthognathic surgeries and craniofacial reconstructions with free vascularized bone flaps. Target endpoint included adherence to initial planning during surgery, categorized as complete, complete with minor difficulties, incomplete or abandoned.

RESULTS: 41 computer-assisted surgeries were completed in the time period analyzed. Operative indications included 34 orthognathic surgeries and 7 free flaps for mandibular, maxillary or zygomatic reconstruction. An analysis of errors was done. 70.7% of VSP were adhered to completely, 19.5% adhered to completely with minor difficulties, 4.8% adhered to incompletely, and 4.8% abandoned. Reason for abandonment or incomplete adherence consisted of tumor growth, condyles out of centric position on scan or inadequate cutting guides secondary to engineering error.

CONCLUSIONS: VSP significantly aids the craniofacial surgeon, but it also comprises inherent issues that require vigilance. Implementing an algorithmic approach may facilitate resolution of such problems. With time and experience, VSP can be used as a powerful adjuvant to good clinical judgement.

Learning Objectives:

1. To quantify the proportion of adherence, complete or incomplete, as opposed to abandonment of VSP during the inherent learning curve; and

2. To determine and anticipate pitfalls that might occur with VSP, and to develop tools to adjust to such challenges.

39
THE FEASIBILITY OF DA VINCI® ROBOTIC CLEFT PALATE REPAIR AND DEVELOPMENT OF A NOVEL ROBOTIC INSTRUMENT FOR TRANS-ORAL ROBOTIC SURGERY

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PURPOSE: The purpose of this study is to develop a robotic approach to cleft palate repair utilizing a phantom model as a test bed.

METHOD: A high-fidelity cleft palate phantom was developed from patient imaging and 3D printing. The cleft palate phantom was utilized to test the feasibility of performing a robotic cleft palate repair using a Da Vinci® Si with 5 mm and Xi with 8 mm instruments. Feasibility testing was used to guide design optimization of the instrumentation. A novel robotic wrist was developed utilizing CAD and prototyped using 3D printing.

RESULTS: All steps of a cleft palate repair were completed with both the Si and Xi systems. Fewer instrument collisions and greater instrument excursion was demonstrated with the Xi in comparison to the Si as a result of the slimmer robotic arms and the design of the 8 mm instrument wrist. However, the larger 8 mm instruments obstruct the field of view and restrict the utilization of additional arms. A novel articulating wrist was designed to reduce instrument diameter that consists of two revolute joints and a gripper. A preliminary 3D printed prototype was developed for performance characterization. The design minimizes the number of components and maintains a minimum bending radius. However, larger friction surfaces have been introduced increasing the tension requirements of the actuating cables.

CONCLUSIONS: The Da Vinci® Xi demonstrated superior performance in comparison to the Si as a result of the 8 mm instruments wrist design and slimmer robotic arms. A novel robotic wrist was designed to further miniaturize the instrumentation while minimizing bending radius to ensure more compact instrument articulation within the small confines of the infant oral cavity.

Learning Objectives:

Participants will understand the limitations of utilizing the Da Vinci® system for pediatric trans-oral surgery and the challenges of miniaturizing robotic instruments.

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CORRELATION BETWEEN NASOLABIAL AESTHETICS AND STEREOPHOTOGRAMMETIC ANTHROPOMETRY IN PATIENTS WITH REPAIRED UNILATERAL CLEFT LIP

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PURPOSE: Two-dimensional anthropometric measurements have been used to quantify the morphology of the lip and nose as well as the degree of asymmetry in order to evaluate surgical outcomes of cleft lip repair. The aim of this study was to investigate the correlation between three- dimensional anthropometric measurements and subjective rankings of aesthetic outcomes by cleft care team members.

METHODS: A retrospective case series included ten patients with a unilateral cleft lip repaired by a single surgeon. Nine members of the cleft care team ranked three-dimensional photographs for each patient, acquired using the 3dMD system, from best to worst aesthetic outcome. Anthropometric measurements including the nostril width ratio, lateral lip height ratio, medial lip height ratio and nasal to lip width ratio were obtained using the Canfield Vectra analysis software. A non-parametric Spearman correlation was performed to evaluate the correlation between these ratios and the sum of the aesthetic ranking scores.

RESULTS: Nostril width ratio, lateral lip height ratio, medial lip height ratio and nasal to lip width ratio had an absent to very weak relationship to aesthetic outcome. Columellar deviation was found to have statistically significant strong relationship ($r = 0.707$, $p = 0.022$) to subjective ranking of plastic surgeons and cleft lip and palate experts.

CONCLUSIONS: In three-dimensional photographs, columellar deviation correlated with rankings of aesthetic outcome by cleft team members in patients after unilateral primary cleft lip repair.

Learning Objectives:

At the end of this lecture/workshop, the learner will be able to :

1. Identify anthropometric measurements used in the aesthetic assessment of paediatric patients after cleft lip repair; and

2. Consider the benefits of stereophotogrammetry in the aesthetic evaluation of outcomes following cleft lip repair.

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SURGICAL OUTCOMES AND COMPLICATIONS FOR FACIAL ANIMATION IN PATIENTS WITH MÖBIUS SYNDROME: A 29-YEAR CASE SERIES

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PURPOSE: Möbius syndrome is a complex congenital disorder of unclear etiology involving multiple cranial nerves and associated with unilateral or bilateral facial and abducens nerve palsies. At The Hospital for Sick Children, microneurovascular transfer of free-muscle transplant is the procedure of choice for facial animation. The purpose of this study was to investigate the surgical outcomes of segmental gracilis muscle transplantation to the face using in the majority of cases the motor nerve to the masseter for reinnervation. Post-operative complications and secondary revision surgeries were described.

METHOD: A total of 107 patients (for a total of n = 202 surgical procedures) with Möbius syndrome from a single cohort at The Hospital for Sick Children underwent facial reanimation surgery with free segmental gracilis muscle transfer and microneurovascular repair from January 1st 1985 to

August 31st, 2014. Post-operative complications and revision surgeries were reviewed retrospectively.

RESULTS: From the 202 total surgical procedures performed for facial animation on Möbius syndrome patients, two were excluded as they resulted in cross-facial nerve graft explorations and only three represented secondary revision surgeries (3/197 or 1.5%). Out of the remaining 197 procedures, 23 were first and second stages of cross facial nerve grafts. Immediate complications included two abscesses, three localized cellulitis or erythema, four hematomas, and one transient sciatic nerve palsy.

CONCLUSIONS: Facial animation surgery with free segmental gracilis muscle transfer and microneurovascular repair for patients with Möbius syndrome is a procedure with a low rate of immediate complications and long-term secondary revisions.

Learning objectives:

1. Participants will be able to identify facial animation procedures for Möbius syndrome; and

2. Participants will be able to describe surgical complications and secondary procedures associated with facial animation surgery in the pediatric Möbius syndrome population.

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OBSTETRICAL BRACHIAL PLEXUS INJURY: A NATIONAL GUIDELINE IMPLEMENTATION STRATEGY

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PURPOSE: To establish an evidence-based clinical practice guideline for the primary management of obstetrical brachial plexus injury (OBPI). Four gaps exist in the management of OBPI in Canada: 1) The historic poor use of evidence, 2) Timing of referral to multidisciplinary care, 3) Indications and timing of operative nerve repair, and 4) Distribution of expertise in Canada. Guideline dissemination will contribute to optimizing care and improving clinical outcomes.

METHOD: The consensus team (Canadian OBPI Working Group) was composed of clinicians representing each of Canada's ten multidisciplinary centres. An original meta-analysis of primary nerve repair, and review of Canadian epidemiology and burden were completed. Quality indicators for referral to a multidisciplinary centre were established. A modified Delphi approach was used for consensus, with agreement criteria defined a priori. n integrated knowledge translation approach to implementation was designed including focused dissemination, and a structured referral template.

RESULTS: Nerve repair significantly reduces functional impairment, RR:0.58, 95%CI:0.43- 0.79, p<0.001, I2=0%. Residual impairment is underestimated and uncharacterized in nonoperative literature; residual impairment remains in 27% (95%CI:19-36%). Incidence is 1.24/1000, consistent over the study period. Very strong risk factors were comorbid humerus fracture, shoulder dystocia and comorbid clavicle fracture. The majority (55-60%) of cases were not referred. For referrals, timing was "good" in 28%, "satisfactory" 66%, and "poor" 34%.

CONCLUSIONS: Seven recommendations address clinical gaps, and guide identification, referral, treatment, and outcome assessment. This is the first clinical practice guideline in Canada for plastic surgery. The process established the Canadian OBPI Working Group, a novel network of opinion leaders and researchers for further multidisciplinary guideline development, and prospective multicentre research. A structured referral form is available for primary care. Brachialplexus.ca is a knowledge tool available to primary care and parents.

Learning Objectives:

Participants will identify strategies for practice guideline development and dissemination in Canada.

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IMMEDIATE AND DELAYED BREAST RECONSTRUCTION FOLLOWING THERAPEUTIC MASTECTOMY IN ALBERTA: DISPARITIES IN ACCESS.

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PURPOSE: The aim of this study is to assess immediate and delayed breast reconstruction (IBR & DBR) in the province of Alberta in rural and urban centres.

METHOD: A database was generated using the National Ambulatory Care Reporting System and the Discharge Abstract Database linked to the Alberta Cancer Registry (ACR). Eligible patients diagnosed with invasive breast cancer between 2005 and 2012 undergoing mastectomy and subsequent IBR or DBR were included. Patient demographic data, breast reconstruction details, and geographical location were recorded. Patients were analyzed based on hospital status: rural or urban using the Canada Statistical Guidelines (rural - less than 1,000 residents and less than 400 persons per km2).

RESULTS: Between 2005 and 2012, there were 7005 mastectomies for 7826 breast cancers in Alberta. There were 12 rural hospitals which carried out 439 mastectomies: overall reconstruction rate was 13.2% (58/439) with patients having IBR in 0.9% (4/439) and DBR in 12.3% (54/439). There were 15 urban centres which carried out 6566 mastectomies: overall reconstruction rate was 20.3% (1333 of 6566) with patients having IBR in 5.6% (365/6566) and DBR in 14.7% (968/6566). Significantly more women living in urban areas had immediate breast reconstruction compared to those in rural areas (5.6% vs. 0.9%, p=0.0002). There was no significant difference in rates of delayed breast reconstruction in women living in urban areas compared to those in rural areas (14.7% vs. 12.3%, p=0.221).

CONCLUSION: Rural centres have lower rates of IBR compared to urban centres but DBR are similar. Geographical barriers may limit patient access to immediate breast reconstruction. Urban centres perform more IBR and DBR in total but rural hospitals executed more DBR comparatively.

Learning Objectives:

Participants will understand the effects of urban and rural hospital settings on immediate and delayed breast reconstruction.

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MULTIPLE NERVE CROSS-BRIDGES SUPPORT DONOR AXON REGENERATION INTO CHRONICALLY DENERVATED NERVES, SCHWANN CELL RE-DIFFERENTIATION AND ENHANCED MOTOR ENDPLATE RE-INNERVATION

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PURPOSE: Chronic denervation resulting from long nerve regeneration times and distance is a major contributor to suboptimal regenerative outcomes following nerve injuries. Multiple side-to-side nerve grafts, termed ?cross-bridges?, between intact donor nerves and denervated distal recipient nerve stumps have enhanced the regenerative success after delayed nerve repair. In this study, we examined the cellular basis for this "protection" of the chronically denervated Schwann cells by the donor nerves using a side-to-side nerve bridge model in rats.

METHODS: In Sprague Dawley rats whose neurons express green fluorescent protein (GFP), three side-to-side nerve bridges were placed over a 10 mm distance between opposing epineurial windows of an intact tibial (TIB) nerve and a distal denervated common peroneal (CP) nerve stump. Regenerating axons were counted in cross-section after 4 weeks within the bridges and Schwann cell populations analyzed over a 4-month period using immunofluorescent imaging. Bridge-protected and denervated wet muscle weight was compared after 16 weeks. Muscle force testing and motor unit estimation was compared 5-months after delayed repair.

RESULTS: Side-to-side nerve bridges supported the growth of donor axons across and into the denervated CP nerve stumps. Denervated Schwann cells dedifferentiated to a proliferative, non-myelinating

phenotype but redifferentiated to a myelinating phenotype with expression of myelin basic protein after ingrowth of donor axons. Side-to-side nerve bridges also preserved wet muscle mass of tibialis anterior and extensor digitorum longus muscles. After delayed repair, twitch, tetanic force and motor unit number were all increased in target muscles of nerves protected with these side-to-side nerve bridges.

CONCLUSIONS: Axon regeneration across side-to-side nerve grafts may sustain a pro-regenerative state within the denervated recipient nerve stump and is associated with enhanced motor endplate reinnervation.

Learning Objectives:

To gain insight into the mechanisms of protection for side-to-side nerve grafting, with potential application to end-to-side nerve grafting.

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CD109 DEFICIENCY PROMOTES SKIN FIBROSIS IN A MURINE MODEL

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PURPOSE: Transforming growth factor-beta (TGF-β) plays a critical role in skin homeostasis; its aberrant signaling is implicated in fibrotic disorders like hypertrophic scarring. CD109 is a TGF-β co-receptor that antagonizes its signaling action and inhibits ECM production in vitro. The current study aims to investigate the role of CD109 deficiency on the skin's fibrotic response in a mouse model of bleomycin- induced skin fibrosis.

METHOD: CD109 knockout (KO) mice and their wild type (WT) littermates received subcutaneous bleomycin or saline injections every other day over 28 days. Dermal thickness and collagen structure were examined histologically using hematoxylin and eosin, Masson's trichrome and picrosirius red stainings. The expression of fibronectin, type I collagen, connective tissue growth factor (CTGF) were analyzed using Western blotting. Fibroblasts cultured from KO and WT mice were treated with or without TGF- β, and TGF-β downstream signaling was determined by measuring phospho-Smad2 levels by Western blot. Also, TGF-β-induced fibroblasts migration was analyzed using an in vitro wound healing assay.

RESULTS: In response to bleomycin challenge, KO and WT mice demonstrated similar increase in dermal thickness. KO mice showed a stronger fibrotic response, with significantly increased collagen deposition ($p<0.05$), and fibronectin ($p<0.05$) and CTGF ($p<0.01$) content compared to their WT littermates. Furthermore, cultured fibroblasts from KO mice showed increased TGF-β-induced downstream phospho-Smad2 signaling, and increased wound healing rate in vitro.

CONCLUSIONS: Our results demonstrate that CD109 deficiency promotes TGF-β signaling and skin fibrosis in mice. Understanding of the mechanisms by which CD109 regulates TGF-β signaling may lead to therapeutic strategies targeting the TGF-β pathway to reduce or reverse skin fibrosis and scarring.

Learning Objectives:

1. To understand the effects of TGF-β under normal and pathological states of wound healing; and
2. To understand the inhibitory actions of CD109 on TGF-β in vitro and in vivo.

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FROM BENCH TO BED: CONDUCTING A PHASE 1 CLINICAL DRUG TRIAL IN CANADA. THE SAFETY OF TOPICALLY DELIVERED FS2 IN HUMANS.

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PURPOSE: Clinical trials involving the development of a new drug are subject to rigorous safety and ethics restrictions. A phase I trial is the first stage of testing in human subjects; with a goal to assess the safety and tolerability of a drug in humans. Having completed extensive bench research developing a potentially beneficial compound in the field of scar prevention, our division conducted its first Phase I clinical trial. This was a new product to Health Canada and required toxicity, pharmacodynamic, and pharmacokinetic data collection. We outline the extensive institutional, regional, and federal regulatory process one must navigate to initiate a double-blinded acute and chronic sensitivity phase 1 clinical trial.

METHODS: In Part 1, acute and delayed sensitivity was evaluated. Twenty healthy volunteers were subjected to different drug concentrations for 24h. Blinded assessment of acute skin irritation were evaluated and digitally photographed. Delayed sensitivity was assessed similarly two weeks late through a repeat test. In Part 2, twenty volunteers used the cream daily in a defined area for 30 days. Local skin reactions were assessed and weekly blood and urine samples were analyzed using HPLC to assess systemic absorption and secretion.

RESULTS: There were no local skin reactions in either Part 1 or 2 in this study. The mean baseline kynurenic acid urine concentration and the highest measured urine concentration were within the normal range for non-pregnant humans. There were no increasing concentration trends in time. Kynurenic acid concentrations in blood were almost undetectable.

CONCLUSION: FS2 cream on normal skin is safe with no local or systemic reactions. Planning has begun for Phase II.

Learning Objectives:

This paper is intended to serve as a guide for future aspiring researchers and clinicians alike looking to take basic science ideas forward into clinical practice: from bench to bed.

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AJCC RECOMMENDED CLINICOPATHOLOGICAL FEATURES ARE NOT PREDICTIVE OF SENTINEL LYMPH NODE POSITIVITY IN THIN MELANOMA: A META-ANALYSIS AND META-REGRESSION

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PURPOSE: New AJCC guidelines recommend sentinel lymph node (SLN) biopsy for thin melanoma (Breslow depth <1.0mm) with aggressive pathological features such as ulceration or high mitotic rate. However, the literature has yet to prove a survival benefit for SLN biopsy in thin melanomas. This meta-analysis estimates risk, potential predictors, and outcomes of SLN positivity in the largest pooled sample of thin melanomas.

METHODS: Three databases were searched for SLN positivity in patients with thin melanoma. Study heterogeneity and quality were assessed. Data collected included Breslow depth, mitotic rate, ulceration, regression, Clark?s level, tumour infiltrating lymphocytes (TIL) and vertical growth phase (VGP). SLN positivity was estimated using a random effects model. Association of SLN positivity and the clinicopathological features was investigated using meta-regression. A subgroup analysis compared studies before and after the release of the new guidelines.

RESULTS: 74 studies compromising 32,860 patients with thin melanoma underwent SLN biopsy with a positive event rate of 5.2% (95% CI 4.1-6.7). Meta-regression revealed a statistically significant association between TIL and SLN positivity ($p=0.018$). No association was found between SLN positivity and high mitotic rate, ulceration, Breslow depth, Clark?s level, regression, VGP, recurrence or survival rates. Subgroup analysis did not alter the meta-regression results.

CONCLUSION: TIL was the only clinicopathological feature associated with SLN positivity despite its current omission from the standardized pathological descriptive analysis recommended by AJCC guidelines. SLN positivity was not associated with a survival benefit. Overall, this meta-analysis throws into question the utility of SLN biopsy in thin melanomas on the basis of current selection criteria.

Learning Objectives

1. Review the AJCC histopathological criteria for SLN biopsy in thin melanomas;
2. Examine the association of TIL and SLN positivity in thin melanomas.

48

EVALUATION OF SURGICAL SKILLS IN PLASTIC SURGERY: VALIDITY AND RELIABILITY OF ASSESSMENT USING THE O-SCORE

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Edmonton, AB

PURPOSE: Competency based training requires valid and reliable assessment. The evidence for assessment of surgical skills in plastic surgery is lacking. The O-SCORE tool was developed for use in orthopedic and general surgery.

The purpose of this study was to examine the validity and reliability of the O-SCORE when used in a Canadian plastic surgery residency program.
METHOD: Plastic surgery residents at the University of Alberta were evaluated on breast reduction mammoplasty, mandibular fracture ORIF and hand fracture fixation over an 8 month period. In total 41 evaluations were completed. Generalizability theory was used to determine overall reliability based on two facets. A MANOVA analysis was conducted to compare ratings on individual items and overall score based on year of training. Internal consistency of the items was determined based on 7 raters evaluating a surgical video under controlled conditions.
RESULTS: There were significant differences between PGY1-3 and PGY 4-5 on all items and overall score. The reliability coefficient using G-theory was 0.926 based on two facets: item and occasion. D study results show that 3 occasions would be required to achieve a reliability coefficient of 0.95. The internal consistency of the technical items was also quite high. The Cronbach alpha on the technical items was 0.904.
CONCLUSIONS: This is the first study to report validity and reliability evidence on a global rating scale in plastic surgery. Assessment decisions made with the O-SCORE yields valid and reliable results in plastic surgery training. The assessments also differentiated junior from senior residents. Using this tool as part of an assessment tool armamentarium will keep plastic surgery programs on track with competency based training.
Learning Objectives:
1. Recognize assessment of surgical skills requires valid and reliable methods; and
2. Understand how the O-SCORE can be used to supplement resident assessment.

49
THE PAST 10 YEARS OF CANADIAN PLASTIC SURGERY GRADUATES: IMPLEMENTATION OF ADVANCED TRAINING INTO PRACTICE AND JOB SATISFACTION

J DeSerres*, E Fung, J Olson
Edmonton, AB

PURPOSE: In order to increase one's competitiveness in the current job market, graduates may complete additional degrees and multiple fellowships. The authors sought to determine the impact of this additional training on the practice profile of recent plastic surgery graduates and determine the current state of job satisfaction among this group.
METHOD: An anonymous cross-sectional online survey was created and sent to all graduates of Canadian plastic surgery residencies from 2005-2015. Demographics were collected and questions grouped into clinical, teaching, research, and administrative components. Questions pertaining to job satisfaction were also included. Statistical analysis was performed using a Mann-Whitney U test.
RESULTS: 82 of 266 graduates (31%) from 2005-2015 responded to the survey. 59 respondents (72%) had permanent staff positions at the time of survey completion. Of those with permanent positions, 50 (85%) completed at least one fellowship and 24 (41%) completed a Master's degree or PhD. Of those who did fellowship training, 76% practice primarily in their area of subspecialty, however this had no correlation with job satisfaction (p=0.366). Having an advanced degree was not correlated with higher percentage of practice dedicated to research (4.9% vs 1.5%; p=0.121) however more papers were published among this group (5.46 vs 0.94; p=0.016). 85% of respondents are satisfied with their current position. The main factor influencing job satisfaction was work-life balance, followed by collegiality within the plastic surgery program, and location.
CONCLUSIONs: Recent plastic surgery graduates are practicing in their fields of subspecialty training. Having a postgraduate degree was associated with more publications but without significant increased time dedicated to research. Job satisfaction is high among recent graduates.
Learning Objectives:
1. Determine the correlation of additional training to current practice profiles of recent Canadian plastic surgery residency graduates; and
2. Determine factors that influence job satisfaction in new graduates.

50
ASSESSMENT OF CORE SURGICAL PROCEDURAL COMPETENCIES AMONGST CANADIAN PLASTIC SURGERY RESIDENTS.

J Shih*, N Zhygan, A Knox, D Courtemanche, J Fish, M Brown
Toronto, ON

PURPOSE: Plastic surgery residency training programs are working towards integrating competency-based education into program curriculum and training, a key component of which involves establishing core procedural competencies. This study aims to determine the exposure of graduating Canadian plastic surgery residents to core procedural competencies.
METHOD: A retrospective review of case log procedure data using three databases (T-RES, POWER, New Innovations) from all 10 Canadian English-speaking graduating Plastic Surgery training programs between 2004-2014 was analyzed. Case logs were coded according to 177 core procedural competencies identified as 'Core' by the Delphi Method amongst an expert panel of Canadian plastic surgeons. Statistical analysis includes mean and standard deviation of aggregate data.
RESULTS: A total of 58,377 procedures were logged by 55 graduating residents across Canada between 2004-2014 (average 1057.8±348.2 procedures/resident). Of the thirteen plastic surgery domains, 45% of all procedures were within either Hand, Upper Extremity & Peripheral Nerve (30.2%) or Non-Aesthetic Breast (15.0%). The remainder of domains comprised 0.25-10% of total procedures each (decreasing order - Aesthetic, Basic Principles, Skin, Maxillofacial, Pediatric, Burns, Regional/Free Flaps, Head & Neck, Emergency/Perioperative Care, Abdomen/Trunk/Pelvis, and Lower Extremity). The most frequently performed core procedural competencies (average/resident) included: breast reduction (56.1±30.6), open carpal tunnel release (46.6±34.2), wound management (28.2±24.4), breast reconstruction-flap based (26.9±15.3), and non-melanotic cutaneous malignancy excision (26.8±34.7). Fifty-six of 177 procedures were logged on average less than once in 5 years of residency, including: escharotomy, temporal parietal fascia flap, Guyon's canal release and soft tissue fillers.
CONCLUSIONS: This study identifies areas of significant exposure and underexposure of plastic surgery core procedural competencies, which can help focus surgical education on areas of greater need for surgical skills training and acquisition.
Learning Objectives:
1. Learn what core procedural competencies in plastic surgery are and how their assessment can provide focus for development of competency-based surgical education curriculums; and
2. Understand which areas residents within plastic surgery have significant exposure and underexposure to and where we can focus on surgical skills and simulation development.

CSPS GUEST SPEAKER

50A
HEALTH, BEAUTY AND CELEBRITY CULTURE: WHY DO WE BELIEVE THE BUNK?

T Caulfield
Edmonton, AB

There is a ridiculous amount of science-free health and beauty advice floating around popular culture. And much of this information is conflicting, misleading or just plain crazy. In this presentation Professor Caulfield will explore why and how health and anti-aging information gets so twisted, including the increasingly important role of celebrity culture. He will also review why this matters (and it does!) and what the best available evidence says about how to live a healthy lifestyle.
Learning objectives:
1. Exploration of the significant impact of popular culture on health beliefs and actions; and
2. Considerations of what the best available evidence says and how strategies to counter the misinformation.

GENERAL SCIENTIFIC SESSION

50B
PANEL: CONTROVERSIES IN HAND SURGERY

BS Gan, London
S McCabe, Toronto
D Ross, London, ON

This panel will discuss controversies surrounding two topics in hand surgery:
1: Hand transplantation; and 2: Complicated hand surgery in the emergency room.
The following areas will be covered by the panel members with ample time for audience input:
Hand transplantation: Review of the first Canadian hand transplant and discussion of the merits of hand transplantation, the controversies surrounding immune suppression of hand transplantation, its costs and its funding model.
Complicated hand surgery in the emergency room: There seems to be a tendency to perform more complicated hand surgery, such as flexor tendon repair, digital nerve repair and fracture reduction/fixation in the emergency room settings. Is this a result of resource issues and difficulty to get operating room access, or does this indicate a shift in the standard of care?
Learning Objectives:
At the end of this panel, the learner will be able to:
1. Identify the controversies including immune suppression, expertise and costs issues surrounding composite tissue transplantation of the upper extremity; and
2. Recognize the technical, organizational and medicolegal issues associated with the performance of complex hand surgery in the emergency room.

50C
PANEL: RHINOPLASTY

Moderator: R Warren
Vancouver, BC
Panelists:
Nicholas Carr, Vancouver
Bernd Neu, Toronto
Jaret Olson, Edmonton
Learning Objective:
After the Rhinoplasty panel, attendees will be able to assess and surgically alter the nasal dorsum and nasal tip and they will be able to surgically correct a deviated nose.

50D
PANEL: AESTHETIC AND RECONSTRUCTIVE SURGERY OF THE FEMALE AND MALE GENITALIA

MODERATOR: Dr. Cameron Bowman (Vancouver)
Panelists:
Dr Maud Bélanger (Montreal)
Dr Sean Rice (Toronto)
Dr Kyle Wanzel (Toronto)
This presentation will differentiate between esthetic and reconstructive surgeries in the male and female patient. Following the presentation, attendees will be able to: list the goals of labiaplasty in the context of aesthetic surgery and understand how to perform it; review novel procedures for vaginal rejuvenation and ancillary procedures; list the indications for vaginoplasty and describe several techniques for the creation of a neovagina; understand the goals of penile augmentation and to get the measure of various means to achieve those goals.

50E
PANEL: DIRECT TO IMPLANT RECONSTRUCTION

Moderator: P Gdalevitch
Panelists:
Kirsty Boyd, Toronto
Karl Schwarz, Montréal
Michael Zenn, Durham, NC, USA
Learning Objectives:
1. To learn the advantages of various mastectomy incisions in DTI reconstruction;
2. To learn how to better avoid complications such as mastectomy flap necrosis in DTI reconstruction; and
3. To learn how to achieve improved aesthetic results in DTI reconstruction.

CANADIAN EXPERT

051
MASSIVE WEIGHT LOSS BODY CONTOURING

J Toy
Edmonton, AB

With the rise in bariatric surgical procedures, there has been a concomitant increase in the demand for Plastic Surgical reconstruction after Massive Weight Loss (MWL). Body contouring in the MWL patient requires modification of existing techniques and the utilization of new techniques specifically designed to deal with extreme amounts of excess skin and soft tissue deflation and descent. With multiple body areas needing treatment, the staging and combinations of procedure can be a complex process. Safety and risk management in the MWL patient is of paramount importance.
Learning Objectives:
At the end of this session, the learner will be able to:
1. Understand the scope and procedures required to correct deformities after MWL;
2. Describe the differences between the MWL patient and the non-MWL patient; and
3. Identify safety issues and minimize risk in body contouring patients after massive weight loss.

51
COMPARATIVE IMPACT RESISTANCE OF TITANIUM MESH (TI), POLYMETHYL METHACRYLATE (PMMA) AND POLYETHER ETHER KETONE (PEEK) IN AN IN VITRO CRANIOPLASTY MODEL.

M Murphy*, G Edwards, J Mainprize, C Whyne, O Antonyshyn
Toronto, ON

METHODOLOGY: A virtual skull model with two topographically distinct defects was created. Defects (8x6cm) were designed to represent one highly contoured site (fronto-orbital defect - FO) and one relatively flat site (temporoparietal defect - TP). Three cranioplasty materials (Ti, PMMA and PEEK) were used to manufacture custom skull-specific implants for rigid fixation to the two defects on the skull model. Impact testing used a falling weight design with increasing kinetic energies (KE), as per the American Society of Testing and Materials method D 3029-78. Known impact forces associated with common etiologies of blunt head trauma were referenced to define input KE for increasing levels of impact. Post impact inspection defined failure as implant fracture, >3mm deformation or fixation failure. A load cell measured impact force while a high-speed camera determined impact duration. Group outcomes were measured per site as the average impact force and mechanism of failure.
RESULTS: Initial impact testing (0.5 J) resulted in failure of all Ti implants (>3mm deformation) at both defect sites. PMMA and PEEK implants were unchanged. Impact force was significantly different all groups for TP defects (Ti = 121.7 N, PEEK = 676.7 N, PMMA = 879.2 N) and was significantly less for Ti (154.7 N) when compared with PEEK (954.5 N) and PMMA (946.6 N) for FO defects. Subsequent impact tests will be completed and discussed in context with known energies and forces

experienced in recreational activity (i.e. soccer headball). This will provide novel information to guide cranioplasty material selection and patient safety post cranioplasty.

Learning Objectives:

1. Participants will be able to describe biomechanical properties of common cranioplasty materials; and

2. Participants will be able to identify characteristic energies and forces that increase risk of cranioplasty failure.

52

DEVELOPMENT OF A HIGH-FIDELITY ORBITAL FRACTURE SURGICAL TRAINING MODEL

C Petropolis*, O Antonyshyn

Toronto, ON

PURPOSE: Correction of orbital defects is a difficult skill to master due to limited surgical exposure, soft tissue obstruction and proximity of globe and neurovascular structures. There are no existing training models for the correction of traumatic orbital defects. We sought to develop an inexpensive, high fidelity orbital fracture model including soft tissue structures of the orbit and eyelid.

METHODS: Computer tomography and magnetic resonance imaging data was used to create three-dimensional (3D) representations of the orbital skeleton, globe, extraocular muscles and neurovascular structures. The eyelids anterior and posterior lamella structures were modelled based on anatomical references. The bony structures were constructed from plastic using 3D printing. Soft tissue structures were created with several varieties of silicone and polyurethane. A reusable plastic head with built in table clamp holds the assembled orbit model. A low cost thermoplastic sheet is used to simulate a porous polyethylene orbital implant.

RESULTS: A high fidelity orbital fracture training model with both bony and soft tissue structures of the eyelid and orbit was developed. The model allows both transcutaneous and transconjunctival approaches to the orbit. Material costs per use of the model is $30.

CONCLUSIONS: By providing an outlet for deliberate practice, this model may reduce operating room time spent teaching basics and maximize the benefit from actual cases. Further evaluation for validation and refinement of the model is currently underway.

Learning Objectives:

At the end of this presentation, the learner will be able to:

1. List the current limitations of orbital fracture surgical simulators

2. Understand the benefits of a training model containing both skeletal and soft tissue structures

3. Identify the potential and value of 3D modelling and 3D printing techniques in surgical education.

53

OPTIMIZING TEMPOROMANDIBULAR JOINTS ALIGNMENT IN SEGMENTAL MANDIBULECTOMY RECONSTRUCTION USING A NOVEL PLATING TECHNIQUE

B Lopez-Obregon*, C Schrag, W Matthews, G Cobb, M Smith

Calgary, AB

PURPOSE: To describe a novel plating technique for mandibular reconstruction.

METHOD: Our patients included those undergoing segmental mandibulectomy and pre-operative planning using CAD/CAM (Computer Assisted Design/Manufacturing) techniques. A novel plate design that allows optimal control of the lateral segments of the mandible was used for the reconstruction. These plates combine an optimized manufacturing process (laser welding), with the addition of positioning tabs in specific locations. We present 3 cases using this technique, where data was collected prospectively and outcomes were analyzed.

RESULTS: Indications included large benign tumours of the jaw and osteoradionecrosis. Average age of the patients was 50 (39-69) and length of the resected mandible was 11,5 cm (6,1-15,7). Length of stay in the hospital was 11.3 days (10-12). Average follow-up was 5,64 months (4 - 8,63). One patient had preoperative pain that disappeared after surgery. None of the patients suffered pain at the temporomandibular joints or mandible after the surgery, and none presented with trismus. All the patients were able to have a good oral intake at discharge. Mouth opening was measured as interincisal- alveolar distance, which was was 46 mm (35-55) preoperatively and 47 mm (48-55) postoperatively. There were no major complications.

CONCLUSIONS: Patient specific plates with positioning tabs are a reliable method to maintain optimal control of the lateral segments of the mandible. This method is particularly beneficial in cases where the segments were previously misplaced or a plate cannot be bent to the native mandible prior to resection.

Learning Objectives:

At the end of this lecture, participants will be able to describe a novel technique using customized reconstruction plates with tabs to achieve optimal alignment outcomes after mandibular reconstruction.

54

POSTERIOR VAULT DISTRACTION IN MULTI-SUTURE CRANIOSYNOSTOSIS: A RADIOLOGIC MORPHOMETRIC ASSESSMENT

JA Ching, A Clausen, C Forrest*

Toronto, ON

PURPOSE: First-line treatment of multi-suture syndromic craniosynostosis has shifted emphasis to posterior vault distraction (PVD) techniques as a way of increasing intracranial volume. To date, the effect of PVD on craniofacial dysmorphology in these patients has not been well studied. This study was designed to examine the effect of PVD on craniofacial morphology in patients with syndromic multi-suture synostosis using radiologic morphometric analysis and 3D camera analysis.

METHODS: With REB approval, 22 patients (11M, 11F; age 4-149 months) with syndromic craniosynostosis (3 Apert, 4 Pfeiffer, 4 Muenke, 3 Crouzon, 2 chromosomal anomaly, 1 craniofrontonasal dysplasia, 5 unknown) underwent PVD for correction of elevated intracranial pressure (n=12) and/or correction of turribrachycephaly (n=16). Morphometric analysis of sequential CT scout radiographs and lateral skull radiographs assessed turricephaly index (TI=cranial length/height), vertical growth index (VGI=cranial base length/height), absolute vertical height (AVH=sella to vertex distance), and occipital inclination angle (OIA).

RESULTS: Preoperatively, patients exhibited a mean TI of 1.34 (range=1.02-1.53, SD=0.16), VGI of 0.41 (range=0.26-0.58, SD=0.08), AVH of 107.37mm (range=87.4-149.4, SD=15.38), and OIA of 44.54 degrees (range=12.5-67.2, SD=12.17). PVD (n=18) demonstrated increased TI (mean=1.53,$p<0.001$) and VGI (mean=0.44,$p=0.001$), while flattening the OIA (mean=37.5,$p=0.004$). Additional frontal advancement procedures after PVD (n=15) yielded further increase in TI (mean=1.59,$p=0.004$) and VGI (mean=0.47,$p=0.012$). AVH did not change significantly once distraction was initiated. Correlation of postoperative 3D camera images with age-matched controls suggested improved normalization of craniofacial dysmorphology.

CONCLUSIONS: PVD significantly improves craniofacial dysmorphology by increasing calvarial length relative to AVH and flattening occipital inclination, effectively normalizing turricephalic proportions. These results are improved by further frontal advancement surgery. AVH does not appear to increase or decrease after PVD initiation, suggesting aesthetic benefits are due to calvarial length attaining proportion to pre-treatment cranial height.

Learning Objectives:

To evaluate the effect of posterior vault distraction within a defined treatment plan.

055

MEET ME IN ST LOUIS

K Davidge

Toronto, ON

55
SQUAMOSAL SUTURE SYNOSTOSIS - INCIDENCE AND ASSOCIATIONS IN CRANIOFACIAL PATIENTS

BD Murphy*, N Ajabshir, C Perlyn
Miami, FL

PURPOSE: Squamosal suture craniosynostosis is thought to be a relatively rare entity with very few articles in the literature describing the frequency. We sought to determine the incidence of squamosal synostosis in a historical cohort of patients and determine its relationship with synostosis of the major calvarial sutures.

METHODS: All patients undergoing computed tomography imaging for suspected craniosynostosis at our institution over a 15 year period were reviewed by a plastic surgeon and neuroradiologist. Patients with synostosis of the squamosal sutures were identified. Involvement of additional sutures, gender, and the presence of a known syndromic diagnosis were recorded for each patient. Patients greater than 3 years of age or those with a history of prior surgical procedure of the craniofacial skeleton were excluded.

RESULTS: A total of 126 patients met the inclusion criteria. Of these, 26 patients (26/126, 20.6%) with synostosis of the squamosal suture were identified. Two patients were identified with isolated squamosal synostosis (zero syndromic, 2 male), 11 patients had synostosis of one additional suture (2 syndromic, 7 male), and 13 patients had synostosis of two or more additional sutures (11 syndromic, 8 male).

CONCLUSIONS: Craniosynostosis of the squamosal suture in this cohort is much more common than previously reported in the literature. Squamosal synostosis was more commonly associated with syndromic diagnoses and more frequently seen in association with multiple other sutures involved. Isolated synostosis of the squamosal suture may produce a morphologically abnormal head shape in some patients.

Learning Objectives:

The participant should recognize that squamosal synostosis is much more common than previously reported in the literature. Clinicians should be aware that synostosis of the squamosal sutures alone can produce a morphologically abnormal head shape. Consideration of the squamosal suture should be included in the operative plan for those patients undergoing cranial vault remodeling.

56
NASAL MONOBLOC FOR RESIDUAL NASAL AND ORBITAL ASYMMETRY OF UNICORONAL SYNOSTOSIS

JA Ching*, C Forrest
Toronto, ON

PURPOSE: Unicoronal synostosis can result in asymmetries of the orbits and nasal complex. A nasal monobloc mobilizes a united nasal and medial orbital segment of bone to perform corrective translational and rotational movement. The purpose of this study was to examine the surgical outcomes of nasal monobloc for residual orbital and nasal asymmetry related to unicoronal synostosis.

METHOD: A retrospective review of all patients treated with nasal monobloc at our institution was performed. Demographic information was recorded, and relevant imaging (3D and 2D photographs) was utilized for outcome analysis. From imaging, nasal deviation on frontal view, nasal deviation on basal view, and orbital aperture width were assessed. Aperture index (Left aperture width/right aperture width) was calculated from aperture width measurements to compare orbital symmetry. Patients without imaging were excluded.

RESULTS: Inquiry yielded ten patients treated with nasal monobloc, and of these, six patients (3 males, 3 females) had adequate imaging for analysis. Three patients had 3D images, and in the remaining three patients 2D photographs were utilized. 3D images (n=3) exhibited correction of frontal nasal deviation by 67.24% (5.35 degrees), basal nasal deviation by 62.47% (4.52 degrees), and aperture index asymmetry by 79.95%. 2D images (n=3) revealed improvement of frontal nasal deviation by 53.14% (2.95 degrees), basal nasal deviation by 49.75% (2.40 degrees), and aperture index asymmetry by 59.22%. Follow was 3.5 to 68.1 months (mean=22.6 months). All patients were satisfied with their outcome, and no revisions were undertaken.

CONCLUSIONS: Nasal monobloc is a reasonable surgical treatment to improve the long-term sequelae of unicoronal synostosis, including frontal nasal deviation, basal nasal deviation, and orbital aperture asymmetry.

Learning Objectives:

1. To better appreciate the long-term nasal and orbital deformities secondary to unicoronal synostosis; and

2. To evaluate the postoperative result of nasal monobloc for nasal and orbital asymmetry.

57
TISSUE EXPANSION IN PAEDIATRIC PATIENTS: A 10-YEAR REVIEW

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Vancouver, BC

PURPOSE: Tissue expansion provides large, highly vascularized reconstructive flaps which match surrounding tissues in colour, texture, thickness, and hair-bearing characteristics. Pediatric tissue expansion is not risk-free, with complication rates up to 40% reported. Few recent studies have assessed pediatric tissue expansion in Canada. This study reviews one Canadian pediatric plastic surgeon's ten-year experience with tissue expansion. The objectives were to: (1) examine tissue expander complications among the study cohort, (2) examine flap complications in the same cohort and how they relate to expander complications, and (3) increase understanding of the tissue expansion experience in Canada.

METHODS: The study was a retrospective analysis of the records of all patients who underwent tissue expansion by the senior author between October, 2004 and September, 2014 at British Columbia Children?s Hospital in Vancouver. The medical charts and operative reports of eligible patients were reviewed, and data were collected on patient demographics, tissue expansion-specific details, complications and outcomes. Data were analyzed using descriptive statistics. Chi-squared test examined the relationship between expander and flap complications.

RESULTS: Ninety-three expanders were placed in twenty-four patients during forty-nine tissue expansion sessions. Complications occurred in nineteen of ninety-three expanders (ten of twenty-four patients; sixteen of forty-nine sessions), resulting in premature removal of nine expanders. Forty-eight sessions ended with successful defect reconstruction. One session was unsuccessful; the expander became exposed and was removed after a month. Sessions with expander complications appeared to suffer twice as many flap complications, but this was not statistically significant $X2 (1,N=49)= 2.17$, $p= 0.140$.

CONCLUSIONS: Tissue expansion requires a large commitment of both time and effort, and carries a 20% risk of suffering expander complications. Nonetheless, it is a successful reconstructive method in Canada that provides aesthetically pleasing results.

Learning Objective:

Participants will be able to evaluate the Canadian pediatric tissue expansion experience.

58
PARENTAL PERCEPTIONS FOLLOWING CLEFT LIP REPAIR IN THEIR CHILDREN

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Winnipeg, MB

PURPOSE: Cleft lip repair timing is often concerning for parents, with repair at three-months chosen mostly out of convention and offering minimal functional benefit. This study examined the ethics of repair at this early age for the benefit of parents/society if a potentially better cosmetic outcome is possible later.

METHOD: A retrospective cross-sectional survey with open-ended questions asked about various aspects of parental perceptions before and after repair. Parents of children with cleft lip with or without palate under age six years who underwent cleft lip repair from 2004-2011 at a tertiary-care center were surveyed (n=64). This age was chosen to avoid potential parental bias after children begin school. Response rate was 61% (n=37). Fisher's exact test using contingency tables was used to identify statistically significant results.

RESULTS: Nearly all (36/37) parents felt repair was important, citing reasons such as feeding, speech, and appearance. Most (28/37) felt surgery would fix the problem and (20/37) would not delay repair if

better aesthetics were possible later. Most parents were satisfied with repair quality (35/36). On average, repair did not impact parent-child bonding, and eliminated negative interactions with strangers that parents found distressing.

CONCLUSIONS: Arguably, positive parental perceptions of their child?s condition reflect favorably on the child's well-being, and may outweigh any future aesthetic benefit. Therefore, current recommendations are ethical and should be upheld. Future efforts should examine cultural factors, and aesthetic and developmental outcomes of repair at different ages to determine optimal repair timing.

Learning Objectives:

Participants will learn about parent's perceptions surrounding their child's cleft lip repair. Participants will also learn about the ethical arguments in favor of, and in opposition to, cleft lip repair at three months of age.

CANADIAN EXPERT

059
FAT GRAFTING

S Rice
Toronto, ON

59
USING THE SURROGAIT Rx DEVICE TO IMPROVE POSTURAL STABILITY AND GAIT IN PEOPLE WITH MS AND IMPAIRED PLANTAR SENSATION

B Everett*, D Nickerson, J Bauman, J Vienneau, B Blosse, B Nigg
Calgary, AB

PURPOSE: Sequelae of impaired plantar sensation (IPS) include ulcerative wounds, falls, reduced mobility, social isolation, and the need for mobility aides. Based on data from patients with IPS from diabetic peripheral neuropathy, sensory substitution systems can enable primary and secondary ulcer prevention, and improved gait. Given these findings, we looked to other populations with analogous IPS. This study examined the impact of a sensory substitution system (SurroGait Rx, Orpyx Medical Technologies Inc., Calgary, AB) on gait, balance and quality of life in patients with Multiple Sclerosis (MS) with IPS.

METHODS: This pilot prospective cohort study involved people with relapsing-remitting, but clinically stable, MS and IPS. Patients were assessed at baseline and at an eight-week post- training session at the University of Calgary Human Performance Lab. Clinical (Timed 25-Foot Walk [T25FW]), biomechanical (stride parameters and postural sway), and quality of life (MSIS-29) parameters were obtained with the device in 'on' and 'off' conditions.

RESULTS: Twelve patients, mean age 50.7y (31-62y) and mean Expanded Disability Status Scale (EDSS) of 2.4 (0-3) were recruited. Of the 11 that completed all assessments (92%), significant improvements in the MSIS-29 were observed in seven subjects (64%). There appeared to be a binary effect on walking speed--some individuals responded (n=7, 64%), whereas others (n=4) did not. For those who responded, there was an average reduction in the T25FW of 0.53 seconds ($p<0.05$). Although there was a trend toward greater stride frequency in the post-training and post-washout states in 5/11 subjects (45%), this difference was not significant overall. The device also showed an impact on standing balance, with total path lengths of postural sway being greater across all time points for the device 'on' condition ($F = 8.53$, $p = 0.033$).

CONCLUSIONS: Preliminary data suggest that use of the SurroGait Rx in IPS shows significant impact on multiple outcome domains and that the level of impact is linked to severity of disability. The capacity of this device to improve IPS-related sequelae, while improving patient quality of life, inspires continued investigation.

Learning Objectives:

1. Participants will be able to identify the impact of the SurroGait Rx ™ system in people with Multiple Sclerosis with Impaired Plantar Sensation (IPS) with respect to clinical, biomechanical and quality of life-related outcomes.

60
BARRIERS AND ATTITUDES TO RESEARCH AMONG RESIDENTS IN PLASTIC AND RECONSTRUCTIVE SURGERY: A NATIONAL MULTICENTER CROSS-SECTIONAL STUDY

The Canadian Plastic Surgery Research Collaborative (CPSRC)
Presenter: M Al-Taha
Halifax, NS

PURPOSE: Research sets the foundation for developing plastic surgeons who think critically and approach clinical practice with an inquisitive mind. The objective of this study was to characterize current attitudes and perceived barriers towards conducting research during residency.

METHODS: A 36-item questionnaire was developed by a national task-force of plastic surgery trainees. A literature review was conducted to design the questionnaire and responses were collected using a mixture of Likert scales and short answers. The anonymous online survey was distributed to all plastic surgery programs. A quality improvement ethics application (A pRoject Ethics Community Consensus Initiative [ARECCI]) was obtained.

RESULTS: The response rate was 65% (98/150) with representation from all 13 plastic surgery programs across Canada. More than 70% of residents were interested in conducting research during residency and 78% of programs were found to have a research requirement integrated into their curriculum. Despite this, greater than half of residents (56.0%) believed that their program does not foster a culture that promotes research due to a lack of internal research funding (76.8%), limited access to a research methods or clinical trials unit (76.7%), and insufficient research training (31.0%). The top three perceived barriers to conducting research were lack of time (88.1%), insufficient access to research supervisors and mentors (45.2%) and the research ethics process (42.9%). University research ranking (QS World University Ranking) had no correlation with residents' scholarly output or their perceptions towards research barriers.

CONCLUSION: Canadian Plastic Surgery residents identified several important factors considered to be barriers to research. Programs can address these barriers to improve the integration of research throughout residency training.

Learning Objectives:

Attendees will discover the current attitudes and barriers to research amongst residents nationally.

61
EXTENDED SENSORY BLOCKADE USING HYDROGEL ENCAPSULATED BUPIVACAINE

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PURPOSE: Wound infiltration with current local anesthetics yields suboptimal relief from postsurgical pain, which may last for days, and surgical patients frequently require opioids for pain management. Given the side effects and dependency associated with their use, a reduction in the necessity for opioids could improve outcomes. Extending the duration of action of local anesthetics could aid in this endeavor. Using a rat sciatic nerve block model, we investigated the efficacy of a novel hydrogel combined with bupivacaine.

METHODS: Rats received an injection of either a control bupivacaine solution or hydrogel encapsulated bupivacaine around the sciatic nerve. Assessment of the nerve block included the Von Frey monofilament test, a noxious pinch test, and cold plantar assay.

RESULTS: In a sample of 62 male Sprague Daley rats, the hydrogel encapsulated bupivacaine resulted in a significantly ($p<0.001$) longer nerve block of 21.4 ± 4.4 hours as measured by the Von Frey test; this is approximately 13 times the duration of the control nerve block. The hydrogel encapsulated bupivacaine also yielded a significantly longer nerve block as measured by the noxious pinch test ($p<0.001$) and cold plantar assay ($p<0.01$).

CONCLUSION: This hydrogel encapsulated bupivacaine yields a significantly longer nerve block than bupivacaine alone. We suspect that a single dose of this compound may provide regional anesthesia for several days in

humans. Given the potential morbidities associated with opiate use and the fact that pain is the primary reason for readmission after any type of surgical procedure, our findings may have major clinical implications.

Learning Objectives:

At the end of this presentation, audience members will appreciate the efficacy of a novel extended local anesthetic. It would behoove clinicians to be aware of new extended local anesthetics as options for postoperative pain management so that they may be considered for incorporation into practice.

GENERAL POSTER SESSION

GP01

NON-INVASIVE MEASUREMENT OF METHEMOGLOBIN UTILIZING NIR SPECTROSCOPY IN PARTIAL THICKNESS HUMAN BURN WOUNDS

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PURPOSE: Methemoglobin (MHB) is associated with tissue ischemia and necrosis. We hypothesize that increased MHB levels are a marker of the degree of tissue injury. The purpose of this study is to test the capacity of Near-Infrared Spectroscopy (NIR) to assess MHB levels in vivo at the bedside.

METHODS: NIR spectroscopy data was collected from a total of 297 burn sites from 26 patients. Measurements were taken from burn and control sites 24, 48, and 72 hours post-burn injury. Methemoglobin was extracted from spectra at 630nm using the Beer-Lambert relationship (MATLAB v. R2014b). T-tests and ANOVA were used to analyze differences between groups (SPSS v.23).

RESULTS: Methemoglobin levels showed a statistically significant increase in non-viable burns relative to viable burn and control sites ($p<0.05$). This difference was more pronounced over time, allowing the differentiation of burn depth as early as 24 hours post-burn injury. At 24 hours, methemoglobin levels increased by 25% in non-viable injuries compared to viable wounds and was 44% greater than that of control. At 48 hours, MHB in non-viable injuries increased to 46% above non-viable injury and 73% greater than control. By 72 hours post-burn, non-viable burns had MHB 80% greater than control.

CONCLUSIONS: Methemoglobin levels are a marker for the depth of burn injury. Non-viable wounds showed a statistically significant increase in MHB levels compared to viable burns and control. NIR spectroscopy is a novel tool for measuring the degree of burn injury in a clinical setting at the bedside.

Learning Objectives:

1. Participants will be able to explain how Methemoglobin acts as a marker for burn depth;

2. Participants will be able to explain how NIR technology is used to assess burn depth non-invasively; and

3. Participants will be able to describe the clinical advantages of using NIR techniques to measure burn depth non-invasively.

GP02

ELEVATED METHEMOGLOBIN LEVELS AS A NEW VARIABLE TO DISTINGUISH BURN DEPTH IN A PORCINE BURN MODEL

DI Duta*, K Cross, L Leonardi, JS Fish
Toronto, ON

PURPOSE: Methemoglobin (MHB) is a surrogate marker of free radical content and tissue injury. The purpose of this study was to develop a non-invasive tool, Near Infrared Spectroscopy (NIR) to measure MHB and to determine if MHB could distinguish between superficial (viable) and deep partial (non-viable) thickness burn injuries in a porcine model.

METHODS: Burn sites (n=6) and control sites (n=5) were created on the dorsum of Yorkshire swine (n=16) using a validated porcine burn model. NIR data was collected from burn and control sites pre-burn, post-burn, 24, 48, and 72 hours after injury. MHB was extracted from the spectra at 630nm using the Beer-Lambert relationship (MATLAB v. R2014b). T-tests and ANOVA were used to analyze differences between the groups at the time points specified.

RESULTS: Methemoglobin levels showed a statistically significant increase in non-viable burn sites relative to viable burn and control sites ($p<0.05$). This difference became more pronounced over time, and allowed the differentiation of burn depth as early as 24 hours post burn injury. Non-viable injury MHB levels were 29% greater than viable injuries and 50% greater than control at 24 hours post-burn. By 72 hours post burn injury, deep non-viable injuries MHB levels were 66% greater than viable burns and showed a 72% increase above control levels.

CONCLUSIONS: Methemoglobin levels in non-viable wounds were elevated above control sites and superficial partial thickness burns at early time points. MHB, as measured with NIR, is a new physiologic variable that can be used to distinguish partial thickness injuries.

Learning Objectives:

1. Participants will be able to explain how Methemoglobin acts as a marker for burn depth in a porcine model;

2. Participants will be able to describe how NIR technology is used to assess burn depth non-invasively;

3. Participants will be introduced to models of burn depth determination.

GP03

THE IMPACT OF A PRE-EXISTING PSYCHIATRIC DIAGNOSIS ON BURN INJURY OUTCOMES: RESULTS FROM A BURN UNIT IN NOVA SCOTIA, CANADA

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PURPOSE: To determine the impact of a pre-existing psychiatric diagnosis on burn injury outcomes for patients admitted to a burn unit.

METHODS: A retrospective chart review of 479 consecutive patients admitted to the Burn Unit of an academic hospital in Nova Scotia between March 1995 and June 2013 was performed. Data regarding patient and burn injury characteristics was collected. Patients with and without pre-existing psychiatric diagnoses at the time of hospital admission were compared.

RESULTS: Sixty-three (13%) patients had a psychiatric diagnosis, with the most common being depression (52%), substance use disorder (27%), and schizophrenia (21%). Forty-percent (n=25/63) of these patients had multiple pre-existing psychiatric diagnoses. Patients with a psychiatric diagnosis had a greater total-body-surface-area (TBSA) % of third degree burns ($p=0.001$), and were more likely to have an inhalational injury ($p<0.001$). Also, these patients were significantly more likely to experience in-hospital complications, require transfusions ($p=0.007$) and had a higher mortality rate ($p=0.02$). A psychiatric diagnosis was associated with significantly more placement issues (e.g. rehab bed unavailability, homeless) upon discharge from the Burn Unit ($p=0.01$). Using multivariate regression, a psychiatric diagnosis was significantly associated with higher readmission rate after adjusting for other co-morbidities, B=0.238; 95% CI 0.109 -0.368 and $p=0.009$.

CONCLUSIONS: Presence of a pre-existing psychiatric disorder in burn patients was associated with worse outcomes. Psychiatric diagnoses should be identified early in burn injury treatment and efforts should be made to ensure a comprehensive approach to inpatient support and discharge, to reduce unfavorable burn injury outcomes and placement issues.

Learning Objective:

Attendees will discover the impact of a psychiatric diagnosis on the prognosis of burn patients.

GP04

POST BREAST SURGERY PAIN SYNDROME: REDEFINING POST-MASTECTOMY PAIN SYNDROME TO PROVIDE A STANDARD FOR CLINICAL AND RESEARCH APPLICATIONS

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PURPOSE: Post-mastectomy pain syndrome (PMPS) is a common complication of breast surgery, including breast reductions, reconstructions and other procedures outside of mastectomies. Currently, there is no standard definition for this chronic pain syndrome. The purpose of this review was

to identify the important elements that have been included in the definitions and how they vary across the literature, determine how these definitions affect the methodological components therein, and to propose a definition that appropriately encompasses all of the appropriate elements.
METHODS: A PubMed search was conducted to retrieve all studies and case reports on PMPS and all retrieved definitions of PMPS, inclusion/exclusion criteria, and methods of measuring PMPS were analysed.
RESULTS: Twenty-three studies were included in the review. Seven independent domains for defining PMPS were identified: surgical breast procedure, neuropathic nature, pain of at least moderate intensity, protracted duration, frequent symptoms, appropriate location of the symptoms, and exacerbation with movement. These domains were used to varying degrees across the literature. Inclusion/exclusion criteria and methods for assessing PMPS were also markedly varied across the reviewed articles.
CONCLUSION: A new and complete definition is proposed, based on the results of this review, to prevent future discrepancies in both the clinical and research setting. Based on the results of this review, PMPS is defined as pain occurring after any breast surgery, of at least moderate severity, possessing neuropathic qualities, located in the ipsilateral breast/chest wall, axilla, and/or arm, lasting at least 6 months, occurring at least 50% of the time, which may be exacerbated by movements of the shoulder girdle.
Learning Objectives:
Participants will be able to identify the current status of post-mastectomy pain syndrome and its role in plastic surgery. Participants will be familiar with a definition of chronic breast pain that can be applied to their clinical and research pursuits.

GP05
LONGITUDINAL PROFUNDA ARTERY PERFORATOR FLAPS FOR BILATERAL BREAST RECONSTRUCTIONS

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Montréal, QC

PURPOSE: Many autologus options have been described in breast reconstruction. The profunda artery perforator flaps are gaining popularity for patients whom abdominal based reconstruction is contraindicated. It has been described with a transverse skin pattern utilizing the upper thigh soft tissue and most the proximal perforator to provide adequate soft tissue and aesthetically acceptable donor site.
METHODS: We present a novel technique for using the profunda artery perforator flap in a case of delayed bilateral breast reconstruction. Our technique utilizes the inner thigh soft tissue with a longitudinal skin paddle design, using the mid inner thigh profunda artery perforators, thus likely incorporating more soft tissue volume for transfer. This flap would be ideal for patients with excessive inner thigh tissue who would benefit from an inner thigh plasty.
CONCLUSION: The longitudinal skin paddle profunda artery perforator flap appears as a good option for breast reconstruction in selected patients. It aims toward increasing the soft tissue volume in women who lack the abdomen as donor, and creating and inconspicuous donor site that resembles the vertical scar of an inner thigh plasty.
Learning Objective:
Attendees will be able to appreciate an alternative option and flap design for women undergoing breast reconstruction.

GP06
KIENBÖCK'S DISEASE; A REVIEW OF 100 CONSECUTIVE SURGICAL CASES

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BACKGROUND: Treatment of Kienböck disease remains controversial. The purpose of this study was to retrospectively review and compare outcomes of our surgical treatment modalities in management of different stages of Kienböck disease.
METHODS: A retrospective review of 147 patients with average age of 35.9 years (13-75 years) and average follow up of 42.5 months (12 months-29 years) undergoing surgical interventions for management of Kienböck disease between 1976 and 2001 was performed. All patients with less than 12 months follow up were excluded. Patients' demographics, duration of symptoms, outcome measures, range of motion, grip and pinch strengths were recorded and compared in different stages of the disease with attention to the surgical intervention. Radiological assessments including carpal height and Stahl's indices were recorded. Statistical analysis was performed by SPSS 22.0 (IBM ™, Armonk, New York). A p- value <0.05 was considered statistically significant.
RESULTS: Out of 147 patients, 115 met the inclusion criteria. One-hundred patients had accessible preoperative and follow up radiographs. There were a total of two patients in stage I, 23 stage II, 42 stage IIIA, 29 stage IIIB, and 4 in stage IV. In early stages of Kienböck disease (stages I and II), there was no benefit noted between different surgical methods for range-of-motion, DASH, or PRWE scores. Patients in stage IIIA and IIIB had stable or slight improvement in wrist motion after vascularized bone graft compared to a decrease in flexion-extension and radio-ulnar deviation arcs after radial shortening, and scaphocapitate arthrodesis. Thirteen patients (13.7%) underwent revision procedures. There were no significant differences noted in revision rates, DASH, and PRWE scores between any of the procedures at any stage.
CONCLUSIONS: In conclusion, pedicled vascularized bone graft could be a superior option for preservation of range-of-motion and improving grip strength with adequate pain relieve for stages II, IIIA, and IIIB. Proximal row carpectomy led to a loss of motion and decreased grip strength in stage IIIB and IV patients. Hence, in a young patient this should only be performed in selected cases.
Learning Objectives:
At the end of this presentation the participants will be able to:
1. Recognize factors contributing to better outcome after surgical management of Kienbock's disease;
2. Develop an algorithm for the management of different stages of Kienbock's disease; and
3. Compare some of local and distant vascularized transfers in management of advanced Kienbock's disease.

GP07
CONGENITAL AURICULAR RECONSTRUCTION: 10 YEARS OF EXPERIENCE

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INTRODUCTION: The pathology of the ear flap, acquired or congenital, represents various specificities related to the anatomy and physiology of this body. Auricular Reconstruction represents a real challenge for the plastic surgeon for the complexity of anatomical structures and the cartilaginous structure.
MATERIALS AND METHODS: Through a series of a total of 48 cases and partial reconstruction of the pinna in 45 patients grouped in 8 years from January 2006 to January 2016 operated by the same surgeon, and through a literature review, we report the different epidemiological, clinical, therapeutic and psychologic of this reconstructive surgery whose qualities results have improved over the last 20 years.
RESULTS: Auricular Reconstruction for microtia, has concerned 16 patients developing a bilateral microtia with a female predominance. Microtia type I on the right side according to Nagata classification, is more common in our patients. 45.45% of our patients with microtia were treated by Nagata technique. Regarding Auricular reconstruction in acquired defects, 32 patients, whose average age is 38 years, were treated. Traumatic disease is the most common case with 18, followed by the burn scars with 9 patients followed by tumor resection in 5 cases. The traumatic pathologies classified as Ba'inka I are found in 38.46% of cases. The tumor pathology is dominated by squamous cell carcinomas with 3 cases. 61.76% of acquired pathologies were treated with cartilage flaps and grafts. When the pathologies are limited, the cartilage graft is taken from the contralateral ear especially from the conch.
DISCUSSION: The autologous costal cartilage is the most suitable support. The integrity of the mastoid skin is the best prognostic factor for Auricular reconstruction. If it is damaged, the superficial temporalis fascia may be used. If it was destroyed, indirect expansion is the last resort before laying an epenthesis. The evaluation of the psychological profile of

patients after Auricular reconstruction, allowed objectifying the importance of timing in the management, leading a very significant improvement on psychomotor and psychosocial development.

CONCLUSION: Finally, this surgery should not be designed on the occasion, because it requires a learning curve and training in sculpting the cartilage model and the choice of techniques and the best indication.

Learning Objectives:

At the end of this lecture, the learner will be able to identify the different epidemiological, clinical, therapeutic and psychologic of the reconstructive surgery whose qualities results have improved over the last 20 years.

GP08

WHY THE P-VALUE ALONE IS NOT ENOUGH: THE IMPACT OF REPORTING CONFIDENCE INTERVALS IN THE PLASTIC SURGERY LITERATURE

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PURPOSE: The p-value is one of the most utilized descriptors in statistical analysis; however, when reported in isolation, it does not convey the effect size of a treatment. The reporting of confidence intervals is an essential adjunct to determine the clinical value of treatment, as it permits an assessment of the effect size. The objective of this study was to assess the reporting of confidence intervals in clinical trials within the plastic surgery literature.

METHODS: The seven highest impact plastic surgery journals of different domains were screened using MEDLINE for clinical trials in the years 2006, 2009, 2012, and 2015. Studies were randomized based on a predetermined sample size. Various characteristics including the Jadad quality score, statistical significance of the study findings, year of publication, journal impact factor, and participation of a methodologist were documented and their influence on the use of confidence interval was examined.

RESULTS: Two independent reviewers analyzed 135 articles. There was substantial inter-rater agreement (kappa=0.78). Although, 86% of the studies reported a p-value, only 27% reported the confidence intervals. The quality of the studies had a median Jadad score of 2 out of 5 (IQR 0-3.75). Bivariate analysis revealed that a higher Jadad score (p=0.023) and inclusion of a research methodologist (p=0.002) were associated with the reporting of confidence intervals. Multivariate analysis revealed similar findings, while journal impact factor, year of publication and statistical significance were not correlated with confidence interval reporting.

CONCLUSION: Confidence intervals are under-reported in the plastic surgery literature. The impact of this problem is discussed. To improve the reporting quality of clinical trials, results should always include the confidence intervals to avoid the misinterpretation of the effect size of a statistically significant result.

Learning Objective:

Attendees will appreciate the importance of reporting confidence intervals in clinical trials.

GP09

BURN SCARRING ALOPECIA: USE OF EXPANSION

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INTRODUCTION : Les séquelles esthétiques des alopécies cicatricielles sur séquelles de brûlures sont responsables de préjudices empêchant parfois la réinsertion sociale du patient, surtout chez les sujets de sexe féminin. L'expansion cutanée a révolutionnée le traitement dans la plupart des séquelles alopéciques.

MATÉRIEL ET MÉTHODES: Nous avons réalisé une étude rétrospective : 80 cas (98 expandeurs) sur 4 ans de janvier 2010 au janvier2014 au centre national des brûlés et de chirurgie plastique au CHU Ibn-Rochd CASABLANCA.

RÉSULTATS : L'âge moyen de nos patient été 19 ans dont 36% descas sont des enfants, avec prédominance féminine (Sex-ratio = 0,65).La surface moyen lésionnelle est de 91.3 cm^2.l'étendues touche au moins 2 régions dans 65 cas (soit 81,2%) avec prédominance temporo-pariéto-frontale dans 27%. La forme de la prothèse est essentiellement rectangulaire avec un volume moyen = 570 cc. Le procédé de réparation a consisté sur des lambeaux locaux pédiculés expansés d'avancement dans 60% des cas, de rotation dans 20% des cas, et de transposition dans 10%. Nous avons eu un taux de complication de 17.2%. L'infection avec exposition de la prothèse est dominée avec 5 cas.

CONCLUSION : Le lambeau expansé du cuir chevelu présente un intérêt essentiel en chirurgie plastique, en particulier dans le traitement des alopécies cicatricielles du cuir chevelu sur séquelles de brûlures, cet intérêt revêt toute son importance chez les femmes, pour qui le souci esthétique est plus prononcé.

Objectifs d'apprentissage:

At the end of this lecture, the learner will be able to analyse the different complications and to highlight the correlation factors, which can limit the risk of complications.

GP10

PULSE WAVE VELOCITY IMAGING: A NOVEL OPTICAL TECHNOLOGY FOR ASSESSING TISSUE BLOOD FLOW

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PURPOSE: Our purpose was to validate novel Pulse Wave Velocity Imaging (PWVi) technology used to assess ischemia. PWVi generates the same information as Doppler ultrasonography and photoplethysmography (PPG). PWVi's advantage is that it is quick and does not require a specialized vascular laboratory. PWVi is superior to our current practice of utilizing Doppler to assess blood flow in flaps and limbs. This is a pilot study testing the first generation of PWVi.

METHOD: PWVi is based on a 12-bit RGB camera (Basler acA-2000-165uc) capturing videos at 1000 fps. Videos of the hands of healthy individuals were taken under fluorescent, incandescent, LED, and natural lighting, and processed to assess pulse wave velocity (PWV) and PPG signals. Videos were also acquired from an 'ischaemic' finger, clamped with a tourniquet, to determine the technology's sensitivity to pulse presence and amplitude.

RESULTS: PWV and PPG waveforms were readily collected under all lighting conditions. The PWVi device performed well even without an external source of illumination. This represents a major advance in optical imaging. PWVi was also able to differentiate between 'ischaemic' and non-ischaemic fingers by the amplitude of the PPG alone.

CONCLUSIONS: We captured PWV and PPG measurements using a simple RGB camera. Blood flow and interventions can be monitored in real-time utilizing this device. This represents a significant advantage for plastic surgeons, as we rely on skin perfusion for reconstructions of all areas of the human body. This device will eventually be miniaturized to attach to a smart phone to make it more accessible.

Learning Objectives:

1. To understand why PWV and PPG waveforms are a superior measurement of blood flow compared to conventional Doppler measurement; and

2. To introduce the concept of optical technologies and their utilization in Plastic Surgery.

GP11

DIGITAL NECROSIS FOLLOWING INFILTRATION OF LOCAL ANESTHETIC CONTAINING EPINEPHRINE

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BACKGROUND: Local anesthesia with epinephrine is widely used in minor hand procedures, contrary to the textbook dogma contraindicating its use in the fingers. Although the literature supports its safety, three case reports to date show an ischemic adverse event from the use of lidocaine and epinephrine at a concentration of less than 1:100,000. Herein we present the first reported Canadian case of finger necrosis and subsequent amputation in a patient with a smoking history, following the use of 1% lidocaine with 1:100,000 epinephrine.

METHODS: This is a retrospective review of a single case. A PubMed search was performed for all relevant articles describing local anesthesia use with epinephrine in the hand and subsequent adverse events including finger necrosis and amputation.

RESULTS: Three cases, excluding this one, of finger necrosis after routine use of epinephrine in local anesthesia were found. This case describes an otherwise healthy 63-year-old female with a 40-pack-year smoking history, who underwent trigger finger surgery under local anesthesia with 1% xylocaine (lidocaine) with 1:100,000 epinephrine. She later presented with severe pain, blisters and dusky index, middle and ring fingertips. The ischemic necrosis progressed and she required amputation of her gangrenous fingertips.
CONCLUSIONS: Although digital necrosis associated with local anesthetic containing epinephrine is a rare event, surgeons should exercise caution when infiltrating epinephrine into the hand of a patient with poor vasculature due to chronic heavy smoking.
Learning Objectives:
The learning objective of this case report is to describe a potential complication of local anesthetic with epinephrine used in the hand and fingers, especially those with an extensive smoking history.

GP12
ATTITUDES AND PRACTICE PATTERNS FOR BREAST CANCER RECONSTRUCTION DIFFER FROM PROVINCIAL GUIDELINE RECOMMENDATIONS

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Hamilton, ON

PURPOSE: To characterize attitudes and practice patterns for breast cancer reconstruction among physicians and surgeons who specialize in breast cancer, and identify gaps between provincial guidelines and current clinical practice. Without an approach to implementation, guideline recommendations often fail to achieve potential benefits in care process, application of best evidence, and practice consistency.
METHOD: A mail survey of 1160 Ontario plastic and general surgeons, and radiation and medical oncologists was administered following item generation, item reduction, pilot testing, and clinical sensibility testing. Four clinical domains were assessed: survival, delayed or obscured recurrence detection, delayed adjuvant therapy, and reconstructive outcomes. Responses were compared with Cancer Care Ontario and Alberta Health Services guidelines.
RESULTS: The overall response rate was 48%, with 57% of respondents treating breast cancer, and 75% affiliated with an academic center. Approximately 50% of respondents do not utilize guideline recommendations in management decisions, including 53% of plastic surgeons. For patients not expected to require radiation therapy, 30% still do not support immediate reconstruction. For patients who have received postoperative radiation, 58% support delaying reconstruction by two or more years. Reconstruction is thought to interfere with recurrence detection by 21%. Immediate reconstruction is believed to delay delivery of adjuvant chemotherapy by 40%. The majority of respondents endorse that postoperative radiation of an immediate reconstruction results in delayed adjuvant radiation, increased revision surgery, and inferior aesthetic outcomes.
CONCLUSIONS: Significant variation exists between specialties for support of immediate reconstruction, and interference with recurrence detection. Responses reflect the absence of definitive evidence and consensus in the literature. Responses contrast with provincial guideline recommendations, and gaps are characterized between these guidelines and current clinical practice. Guideline implementation should address these gaps by targeting local barriers, and follow an integrated knowledge translation approach.
Learning Objectives:
To identify gaps between guidelines and practice for breast reconstruction.

GP13
DETERMINING THE POSITION OF THE INFRAMAMMARY FOLD IN RELATION TO THE UNDERLYING ANTERIOR RIBS IN UPRIGHT PA CHEST RADIOGRAPHS

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The level of the inframammary fold (IMF) is an important landmark for reconstructive and cosmetic procedures. Although the IMF is often defined at the level of the sixth rib in anatomy textbooks, there are no studies to verify this statement. Our study aims to define the IMF position in relation to the underlying anterior ribs. This was a prospective clinical study. Ambulatory females receiving upright chest x-rays were recruited. Radiopaque markers were placed at the IMF bilaterally and measured on chest x-ray in relation to anterior rib/rib space. Statistical mean, median and modes were calculated as well as deviation. Additionally, we analyzed the relationship between the IMF compared to age, number of pregnancies, and body mass index (BMI) to determine patterns of variation within the general population. Data are available for 22 patients (mean age 56 years). The mean IMF of the right anterior axilla, right midclavicular, left midclavicular, and left anterior axilla are 8.4, 7.2, 7.0, and 8.2, respectively. The standard deviations (.85, .68, .79, .88) and variance (.72, .46, .61, .78) were low. Pearson correlation coefficient revealed minimal correlation between IMF versus age and number of pregnancies. A moderate positive correlation was observed between IMF and increasing BMI ($r = .52, .30, .45, .63$). Our findings reveal that, on average, the level of the IMF corresponds to the seventh rib at the midclavicular line. Additionally, age and number of pregnancies do not appear to influence the level of the IMF. However, a higher BMI may be related to an anatomically lower IMF.
Learning Objectives:
Participants will learn about defining the level of the IMF in relation to a fixed anatomical structure with the intent of facilitating reconstructive and cosmetic procedures.

GP14
DEVELOPMENT OF A HIGH-FIDELTY BREAST AUGMENTATION SIMULATOR

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PURPOSE: To develop a high-fidelity synthetic benchtop simulator for breast augmentation procedures while maintaining a high level of reusability and a realistic haptic feedback. METHOD: A complete female chest with bilateral breasts was reproduced by molding and casting the external features of an off-the-shelf mannequin. A complete rib cage was as well represented, to which was attached intercostal muscles, bilateral pectoralis major and minor muscles. Together with the skin, the subcutaneous tissue and the nipple/arealor complex, the simulator regrouped all the relevant anatomical structures encountered during an augmentation mammoplasty procedure. Each structure was represented using materials that best mimic its physical characteristics: texture, rigidity and color, and using materials such as silicone, rubber and foam material.
RESULTS: After the aggregation of all the components that constitute the bentchtop breast augmentation simulator, an expert plastic surgeon (MG) performed a subpectoral mammoplasty procedure replicating all the essential steps done on real patients. As such, the operator can start by marking the simulator to identify incision location, prepping/draping and tissue infiltration with local anesthetics. This is followed by skin incision, subcutaneous dissection, subpectoral pocket formation, implant insertion, inframammary fold fixation and multi-layer tissue closure. The procedure was successfully completed and with a high level of realism of experience and haptic feedback.
CONCLUSION: The breast augmentation simulator, developed by our team, was shown, upon testing, to be a valuable tool to perform the essential steps of a subpectoral mammoplasty procedure. This simulator has the potential to be an effective training and assessment tool for novices, although such statement should be demonstrated by face, content and construct validation studies.
Learning Objectives:
Following the current presentation, the audience will be informed of:
1. The process of breast augmentation simulator development; and
2. The surgical steps that could be completed on the simulator.

GP15

LUMPECTOMY RECONSTRUCTION: OUTCOMES AND PATIENT SATISFACTION

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PURPOSE: Breast conserving therapy (BCT) is performed more often than mastectomy for treatment of breast cancer. Although it allows for preservation of native breast tissue, BCT in conjunction with radiation therapy often result in significant breast deformity and asymmetry. This study investigates outcomes and quality-of-life indices in women who underwent reconstructive surgery after lumpectomy.

METHOD: This retrospective case series examines outcome and patient satisfaction data (through 5 validated questionnaires) for patients following lumpectomy and reconstruction at The Ottawa Hospital from July 2014 to present.

RESULTS: Data collection is ongoing. Sixteen patients (mean age=60.5; mean BMI=28.4) underwent a variety of lumpectomy reconstruction procedures (including prosthesis-based and autologous procedures). All patients had successful reconstructions with one moderate complication and four minor complications. Body image and patient satisfaction were markedly improved following lumpectomy reconstruction. Patients had normal-range Impact of Events (mean=22) and Rosenberg Scale (mean=25) scores following reconstruction. Breast-Q scores demonstrated high patient satisfaction for satisfaction with breasts (mean=63.2), satisfaction with nipples (mean=65.5), psychosocial wellbeing (mean=79.1), and sexual wellbeing (mean=55.9).

CONCLUSIONS: Our study demonstrates improved patient satisfaction and quality of life in breast cancer patients following BCT with reconstruction and balancing procedures. At present, large lumpectomy defects and resultant poor cosmesis are an indication for mastectomy; however, this study suggests improved patient satisfaction and quality of life following lumpectomy reconstruction, and a clear role for reconstructive surgery in the setting of BCT.

Learning Objectives:

From this presentation, the audience will better understand the impact of post-lumpectomy reconstruction on patient satisfaction, and recognize the role for the plastic surgeon in this subset of breast cancer patients. The audience will recognize the low complication rate associated with post-lumpectomy reconstruction in spite of these surgeries taking place on irradiated wound beds.

GP16

A RETROSPECTIVE MULTICENTER STUDY IN CANADA OF NATRELLE® INSPIRA® TRUFORM® IMPLANTS IN PRIMARY BREAST AUGMENTATION 2-4 YEARS POST-SURGERY: REOPERATION RATES

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PURPOSE: To evaluate the incidence and causes of reoperation following primary breast augmentation with Natrelle Inspira TruForm 1 or TruForm 2 breast implants.

METHODS: This retrospective study, conducted at multiple sites in Canada, analyzed medical records and subject-completed questionnaires of women who underwent primary breast augmentation with smooth or textured Natrelle Inspira TruForm 1 or 2 implants. All subjects were aged ≥22 years and received implants via inframammary fold incision. Follow-up ranged from 2 to 4 years.

RESULTS: As of December 2015, data were available for 143 subjects (mean ± standard deviation) aged 34.7 ± 7.3 years. All had undergone bilateral breast augmentation, most (n=123 [86.0%]) with submuscular or dual plane implant placement. The majority of subjects (n=134 [93.7%]) received TruForm 2 implants (smooth, n=75; textured, n=59); 9 (6.3%) subjects received TruForm 1 implants (smooth, n=8; textured, n=1). At the time of follow-up, 7 subjects (4.9%) had undergone reoperation, all of whom had received TruForm 2 implants (smooth, n=2 [2.7%]; textured, n=5 [8.5%]). Median time to reoperation was 301 (range, 164-734) days. Six subjects underwent reoperation without explantation, and 1 subject underwent implant removal with replacement. Reasons for reoperation were capsular contracture in 4 cases and implant malposition in 3 cases. Double capsule formation occurred in 2 subjects (1.4%). Forty-two adverse events were reported in 31 subjects; no serious AEs were reported. Overall, 89.5% (n=128) of subjects reported being somewhat or very satisfied with the initial surgery.

CONCLUSIONS: Data from this retrospective analysis suggest that Natrelle Inspira TruForm implants are safe when used in aesthetic breast augmentation, with low reoperation rates that align with data for other breast implants.

Learning Objectives:

Participants will understand the characteristics, safety, and effectiveness of Natrelle Inspira TruForm breast implants and their role in primary breast augmentation.

GP17

INCREASING EFFICIENCY AND PATIENT SATISFACTION IN A PLASTIC SURGERY OUTPATIENT CLINIC USING A MODIFIED LEAN INTERVENTION

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Edmonton, AB

PURPOSE: In today's current healthcare setting there is increasing demand for improved clinical efficiency without compromising patient care. The purpose of this study was to examine the effectiveness of a modified LEAN intervention on clinic efficiency and overall patient satisfaction.

METHOD: A prospective cross-sectional study was performed examining patient appointment duration and overall patient satisfaction before, and after intervention. Intervention consisted of a focus group with clinic stakeholders to identify areas of inefficiency and then implementation of one chosen factor, which was an additional clinical assistant. Controls included call status of surgeons, number of rooms used, and residents in clinic. Upon determining normality of the data, parametric tests were conducted to determine differences between pre-intervention and post-intervention groups. Statistical significance was set at $p<0.05$ with 95% confidence intervals.

RESULTS: The average total appointment duration time from the front desk until conclusion with the physician prior to intervention was 92±46 minutes (n=63) while the post intervention duration was 38±16 minutes (n=27), $p<0.001$. When patients were asked if they were satisfied with their visit (using a five point likert scale), mean satisfaction was higher in the post-intervention sample 4.6/5 compared to pre-intervention 3.9/5 ($p=0.007$). The difference was also significant when patients were asked if the time spent in clinic was appropriate: 4.3/5 post-intervention and 3.0/5 ($p<0.001$) pre-intervention.

CONCLUSIONS: Using modified LEAN methodology, the addition of an extra clinical assistant was found to both significantly decrease appointment duration and increase patient satisfaction. Through the use of stakeholder input and a low cost intervention we have shown that clinic efficiency can improve without compromising patient care.

Learning Objectives:

1. Recognize models to improve efficiency;
2. Appreciate the correlation between patient satisfaction and clinical efficiency.

GP18

EFFICACY AND SAFETY OF BILATERAL THORACIC PARAVERTEBRAL BLOCKS IN BREAST SURGERY

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PURPOSE: Unilateral thoracic paravertebral blocks (TPVBs) have demonstrated reliable intraoperative analgesia, low postoperative pain scores, and an opioid-sparing effect in breast cancer surgery. However, secondary to the perceived risk of complications, there is limited use of bilateral TPVBs. The purpose of this study was to evaluate the utility of bilateral TPVBs in safely facilitating same-day discharge in patients undergoing bilateral mastectomy with immediate implant-based reconstruction.

METHODS: Electronic medical records were retrospectively reviewed for patients receiving bilateral TPVBs for bilateral mastectomy with

immediate implant-based reconstruction performed by a single surgeon from September 2012 to September 2015. Records were reviewed for incidence of complications, time to discharge, and incidence of unplanned admission or readmission. Clopper-Pearson method for binomial distribution was used to calculate confidence intervals for proportions.

RESULTS: Forty-five patients undergoing bilateral mastectomy with immediate reconstruction received bilateral TPVBs. Mean BMI was 26.2 (SE=0.9), 71% (n=32) had reconstruction with implants compared with 29% (n=13) with tissue expanders, and 31% (n=14) had a sentinel node biopsy or axillary dissection. There were 4 TPVB-related complications, all of which were vasovagal episodes (9%; 95% CI, 2%-21%). There was no incidence of symptomatic pneumothorax. Mean time to discharge readiness from the post-anesthesia care unit was 1.9h (SE=0.1). Overall, 91% (n=29) of the 32 patients scheduled for day surgery were discharged home as planned. Mean time from surgery to home discharge for day surgery patients (n=32) and planned admissions (n=13) was 5.9h (SE=0.8) and 16.3h (SE=1.0) respectively. There was no incidence of readmission following discharge.

CONCLUSIONS: Bilateral TPVBs can safely facilitate day surgery in carefully selected patients undergoing bilateral mastectomy with immediate implant-based reconstruction.

Learning Objectives:

Participants will understand the risks and benefits of bilateral TPVBs in patients undergoing bilateral mastectomy with immediate implant-based reconstruction.

GP19

PAIN IN INFANTS WITH OBSTETRICAL BRACHIAL PLEXUS PALSY FOLLOWING PRIMARY MICROSURGICAL RECONSTRUCTION

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Toronto, ON

PURPOSE: Pain in children with obstetrical brachial plexus palsy (OBPP) is under- appreciated and not well understood. Objective evaluation of pain in infants with OBPP is needed to better understand longitudinal trajectories of pain experienced by this population. The purpose of this study was to evaluate postoperative pain in infants with OBPP undergoing microsurgical reconstruction.

METHOD: A retrospective cohort study was conducted of infants with OBPP undergoing microsurgical reconstruction of the brachial plexus between 2001 and 2015. Postoperative pain was evaluated using the well-validated Face, Legs, Activity, Cry, Consolability (FLACC) scale, and opioid requirements. Intensity of pain was determined by the proportion of FLACC scores that were > 0.

RESULTS: 159 infants were evaluated: 60 (38%) with upper plexus and 99 (62%) with total plexus palsy. Mean age at the time of surgery was 6.8±3.1 months (range: 0.7 to 14.3 months). The overall mean and median of the FLACC scores were 0.8 ± 1.9 (mean ± SD) and 0 for all observations (n=3213 scores). Both the median and the distribution of FLACC scores did not statistically differ between postoperative day 1 through 8. The proportion of FLACC scores > 0 was not statistically different between infants with total versus upper plexus palsy. The overall mean and median of opioid requirements from the post-anaesthesia care unit to postoperative day 2 were 4.5 ± 1.9 (mean ± SD) and 4.2 mg (n=152).

CONCLUSIONS: Objective assessment of infants with OBPP who had microsurgical reconstruction indicated that these infants have minimal to no pain in the immediate postoperative period.

Learning Objectives:

The participants will be able to:

1. Describe a method of assessing postoperative pain in infants; and

2. Develop an understanding of postoperative pain associated with OBPP microsurgical reconstruction in infants.

RESIDENTS POSTER CORNER

RP01

SUPINATION OUTCOMES IN OBSTETRICAL BRACHIAL PLEXUS INJURY

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Edmonton, AB

PURPOSE: Upper trunk obstetrical brachial plexus injuries (OBPI) result in weakness in shoulder abduction, elbow flexion, and forearm supination and leave the patient with considerable disability. Surgical reconstruction is targeted at restoring shoulder and elbow function; improved supination is often noted as well. The purpose of this study was to test the hypothesis that patients who undergo distal nerve transfer to restore elbow flexion have improved supination compared to those who have spontaneous recovery.

METHODS: A retrospective cohort study was undertaken through the Upper Limb Clinic in Edmonton, Alberta. Inclusion criteria included all patients with an isolated upper trunk OBPI born between January 1, 2003 and December 31, 2013. Exclusion criteria included patients with neurapraxia and those who underwent a primary nerve grafting procedure. The primary outcome of interest was supination as measured by the Active Movement Scale (AMS).

RESULTS: 17 patients fit the inclusion criteria. At 9-month follow-up, the operative group had lower AMS scores in both supination (2.67 vs. 5.00, p=0.02) and elbow flexion (4.33 vs. 6.40, p=0.001). At last follow-up, both groups had improved in supination (5.50 vs. 5.60, p=0.44). In the operative group, some patients achieved full range of motion (range 3-7 vs. 5-6).

CONCLUSIONS: The degree of supination achieved after distal nerve transfer is at least as good, and in some cases better, than that seen in patients who required no primary surgery. These findings suggest that there may be a subset of patients that could benefit from isolated distal nerve transfer to correct supination.

Learning Objectives:

1. Poor supination contributes to disability in patients with obstetrical brachial plexus injury;

2. Distal nerve transfers may be potential option for improving supination in these patients.

RP02

CONTRALATERAL PROPHYLACTIC MASTECTOMY - INDICATIONS BEHIND A RISING TREND.

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Edmonton, AB

PURPOSE: Rates of contralateral prophylactic mastectomy (CPM) are increasing exponentially despite a lack of universally-accepted indications, having a baring on the number of women requiring breast reconstruction. Our study aims to examine both indications for CPM as well as actual practice patterns , both in the literature and regionally, to identify trends and themes.

METHODS: A scoping review of the published English literature, including 138 articles, identified common themes in CPM including proposed indications in BRCA-negative women with unilateral breast cancer. Based on these results, all surgeons that perform breast surgeries at the University of Alberta were surveyed to identify regional indications for CPM and to determine common indications for CPM in their personal practice.

RESULTS: Only one indication from the literature for CPM was universally accepted by both general and plastic surgery: a strong family history despite being BRCA-negative. General surgeons were more inclined to perform CPM for reasons of cosmesis than were plastic surgeons. Other indications including patient anxiety, patient request, and unreliable imaging were variably accepted. In comparison, when evaluating personal practice trends, patient anxiety and request were the predominant reason for performing CPM among general surgeons whereas family history was most common for plastic surgeons.

CONCLUSIONS: There remains no consensus for CPM indications among individual surgeons and a discrepancy exists between theoretical indications and current practice patterns. Re-evaluation of the indications for CPM is necessary to minimize cost and morbidity and for accurately estimating future trends to guide allocation of plastic surgery resources.

Learning Objectives:

At the end of this lecture the learner will be able to:

1. List indications for CPM as reported in the literature; and

2. Identify discrepancies in translation of theoretical indications to active practice,

3. Describe the need for re-evaluation of CPM indications to guide resource allocation.

RP03

ROLE OF ANTIBIOTIC IRRIGATION IN PREVENTING CAPSULAR CONTRACTURE AFTER BREAST AUGMENTATION: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Halifax, NS

PURPOSE: To determine if antibiotic irrigation reduced the rate of capsular contracture compared with saline irrigation.

METHODS: We systematically searched MEDLINE, EMBASE and CENTRAL from inception to January 2016 by two independent reviewers. We included in vivo studies with the following criteria (1) breast augmentation with implants in adult female; (2) the use of intraoperative irrigation with antibiotic. Our primary outcome was postoperative rate of capsular contracture (Baker III and IV). We assessed the methodologic quality of included studies using validated tools. Pooled random effects estimates and 95% confidence intervals for complication and capsular contracture rates were derived. Comparisons were performed for breast augmentation with or without the use of intraoperative antibiotic irrigation using a pooled odds ratio and 95% CI.

RESULTS: A total of 12 studies were ultimately included in the review. Most of the studies were level 4 evidence. The most common antibiotic agents used were gentamicin and bacitracin. The pooled estimates were 2.5% (95% CI, 1.2 - 4.2%) for capsular contracture rate, 4.8% (95% CI, 0.9-11.6%) for reoperation rate, 1.4% (95% CI, 0.5-2.8%) for infection, 2.4% (95% CI, 0.8-4.7%) for seroma and 1.5% (95% CI, 1.2-2.0%) for hematoma. The fixed effects pooled OR of four observational studies was 0.33 (95% CI: 0.19, 0.57) indicating a protective effect for intraoperative antibiotic irrigation over saline control

CONCLUSIONS: The result of the available evidence suggests that the use of antibiotics irrigation is associated with lower risk of capsular contracture. However, lack of adjustment of other clinical factors and the weak quality of the current evidence are potential limitations of this result. This analysis illustrates the need for better designed studies to definitely answer the question.

Learning Objective:

Participant will be able to evaluate the evidence of antibiotic irrigation in preventing capsular contracture and other related complication in breast augmentation.

RP04

CAN YOU DRAW KAPLAN'S CARDINAL LINE AND IS IT ACTUALLY USEFUL?

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PURPOSE: Kaplan's Cardinal Line (KCL) is a landmark to identify deep structures in hand surgery. We document the historical definitions of KCL and explain its variations. We aim to identify the one definition that has the most clinical utility.

METHOD: A literature review and analysis was conducted using the search term "Kaplan's Cardinal Line". This resulted in seven articles, none of which were excluded.

RESULTS: In 1953, Kaplan originally described the KCL as a line drawn from the apex of first web space toward the ulnar hand, parallel to the proximal palmar crease. There were five variations of KCL, three of which differed in Kaplan's own writing regarding the distance distal to the pisiform (2cm, 1cm, and 5mm). In 1996, Hurst described the KCL as a line drawn from the interdigital fold, crossing the hook of hamate. Finally, Brown described the KCL as the ulnar extension from an abducted thumb in 1996. Several cadaveric studies have attempted to correlate the KCL to deeper structures. The recurrent motor branch of the median nerve (MBMN) tends to lie more ulnar and proximal to the intersection between radial third digit and the KCLs. Kaplan's descriptions lie more distal to the transverse carpal ligament and the hook of hamate compared to other authors. Three studies have consistently demonstrated that the superficial palmar arch (SFA) lies approximately 15 mm distal to the original KCL.

CONCLUSIONS: Several definitions of KCL are inaccurate in predicting the deeper hand structures. None of the lines are accurate in localizing the MBMN. However, Kaplan's original description is probably the most accurate and reproducible in identifying that the SFA is located 15mm distally.

Learning Objectives:

Understand the classic definition of KCL Understand the lack of consensus regarding the definitions of KCL Understand the most clinically relevant way to draw KCL.

RP05

COMPARISON OF POST-TREATMENT THERAPEUTIC BURDEN OF COLLAGENASE *CLOSTRIDIUM HISTOLYTICUM* AND SURGERY IN DUPUYTREN'S CONTRACTURE

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PURPOSE: Collagenase *Clostridium histolyticum* (CCH) is a non-surgical treatment method for Dupuytren's contracture that has only been approved for clinical use in Canada since 2012. The purpose of this study was to address the paucity of data regarding the post-treatment therapeutic burden of CCH compared to established treatment alternatives, including surgery and needle aponeurotomy (NA).

METHOD: All cases of Dupuytren's contracture treated by the senior author from 2012-2015 were reviewed. Clinic and therapy records were reviewed to identify the number of therapy visits, clinic visits, and cost of splinting after each type of treatment. A one-way ANOVA was used to compare treatments followed by Games-Howell post hoc analysis (SPSS). Statistical significance was assigned as $p<0.05$.

RESULTS: A total of 101 cases were included in this study: surgery (n=37), NA (n=10), and CCH (n=54). The mean number of therapy visits after surgical (9.6) treatment of Dupuytren's contracture was significantly greater than either CCH (3.8, $p<0.01$) or NA (2.1, $p<0.01$). Clinic visits after treatment were also significantly greater following surgery (5.6) than CCH (4.0, $p<0.01$). There was no significant difference in therapy visits following CCH compared to NA treatment, or in mean cost of splints required after the three treatment options.

CONCLUSIONS: Collagenase *Clostridium histolyticum* imposes a lesser post-treatment therapeutic burden than surgery in treatment of Dupuytren's contractures. Non-surgical treatments are comparable in post-treatment therapeutic requirements. These findings provide groundwork for cost-analysis of Dupuytren's contracture treatment options with an emphasis on post-treatment therapy and resource requirements.

Learning Objectives:

At the end of this presentation, the audience will be able to identify the post-treatment therapeutic burden associated with surgical and non-surgical treatment alternatives for Dupuytren's contracture.

RP06

INJECTABLE COLLAGENASE FOR THE TREATMENT OF DUPUYTREN'S CONTRACTURE

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PURPOSE: Dupuytren's contracture has historically been treated most effectively with limited fasciectomy and this remains currently the most widely used intervention for the disease. Over the past decade, less invasive treatment methods have gained more widespread use. Injectable collagenase derived from *Clostridium histolyticum* (CCH) has recently been

approved in Canada. This study aims to review 6 week outcomes for CCH in the treatment of Dupuytren's contracture.

METHODS: A retrospective review was conducted of the initial cohort of patients treated with injectable collagenase at the Hand and Upper Limb Centre by a single surgeon. Patients were contacted by telephone and asked to complete a questionnaire addressing satisfaction and symptom improvement.

RESULTS: Twenty-seven patients (40 digits) treated with injectable CCH between April 2014 and August 2015 were included. All but three patients had a reduction in flexion contracture after six weeks. A significant improvement in total passive extension deficit was found immediately after manipulation, which was sustained at 6 weeks. Skin tear is the most severe complication that typically resolves within two weeks. The treatment was found to be more effective for MCP joints than PIP joints (86% improvement vs 62% improvement respectively). Patients remained satisfied in treatment with 96% returning to baseline function within 1 week.

CONCLUSION: CCH provides patients an office-based option with faster recovery, less morbidity, and avoidance of a general anesthetic. Their use is limited to the treatment of contractures that is characterized by the presence of individually palpable cords and by the patient's ability to afford the cost of treatment.

Learning Objectives:

Participants will be able to identify specific indications for collagenase injection, describe anticipated clinical outcomes and compare office based procedures to operative intervention for the treatment of Dupuytren's disease.

RP07

EFFICIENT IMAGING: EXAMINING THE VALUE OF ULTRASOUND IN THE DIAGNOSIS OF TRAUMATIC ADULT BRACHIAL PLEXUS INJURIES, A SYSTEMATIC REVIEW

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PURPOSE: Traumatic brachial plexus injuries (BP) result in debilitating injury. Magnetic resonance imaging (MRI) remains the modality of choice for BP assessment, although it is expensive, time-consuming and not available at the bedside. Ultrasound is a promising newcomer to evaluate BP pathologies. Current literature, although supportive, remains limited. The purpose of this systematic review is to evaluate ultrasound as a diagnostic tool in assessment of adult BP injuries.

METHODS: An electronic literature search was completed. Two independent reviewers completed the screening and data extraction process. Methodological quality of studies was evaluated using the QUADAS-2 tool. Statistical analysis was performed for pooled sensitivities and between study heterogeneity. Results: Seven studies were included, six prospective cohort and one retrospective. Mean age of patients was 39 ±14 years. Most common mechanism of injury was motor vehicle collision. Expert radiologists interpreted all scans. A wide range of ultrasound equipment was used and linear transducer frequency ranged from 5 to 17 MHz. Three studies compare detection of pre and post ganglionic lesions at different levels (C5- T1) to the reference standard, surgical exploration. Sensitivity of lesion detection was greater in C5 (89%, CI=60-100), C6 (90%, CI=70-100) and C7 (92%, CI=77-100) than lower roots C8 (54%, CI=27-80%) and T1 (43%, CI=5-80%).

CONCLUSIONS: Individual studies demonstrate ultrasound as an effective diagnostic tool for adult traumatic BP injuries. Specifically, sensitivity of lesion detection was greater in upper (C5 to C7) than lower roots (C8, T1). Current literature is scarce and poor in quality. Further standardized studies should be performed to confirm the value and feasibility of ultrasound in diagnosis of adult BP injuries.

Learning Objectives:

Participants will be able to:

1. Identify the advantages of ultrasound in diagnosis of BP injuries; and

2. Recognize the variety of lesions identifiable by BP ultrasound assessment.

RP08

ULNAR NERVE NEUROPATHY SECONDARY TO "SNAPPING TRICEPS SYNDROME"

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PURPOSE: Cubital tunnel syndrome is the second most common compression neuropathy of the upper extremity and the most common point of compression for the ulnar nerve. The literature primarily lists six sites of ulnar nerve compression at the elbow. There are rare reports of unusual findings including ulnar nerve compression secondary to anatomic variations in the triceps musculature.

METHOD: We present a case of ulnar nerve compression neuropathy at the elbow secondary to an abnormal snapping medial head of triceps with video documentation of triceps and ulnar nerve subluxation. A 37 year old right hand dominant male presented with a history of bilateral medial elbow pain and ulnar distribution hand numbness. He underwent elective left cubital tunnel release with anterior subcutaneous ulnar nerve transposition.

RESULTS: The patient's abnormal anatomy was noted intraoperatively. The initial subfascial transposition was intraoperatively noted to be insufficient and had to be converted to a subcutaneous transposition. Snapping triceps syndrome is an uncommonly described phenomenon causing medial elbow pain. When the snapping triceps occurs with a subluxating ulnar nerve, the combination of the two mechanisms can present with an ulnar compression neuropathy. The ulnar nerve typically begins to dislocate at approximately 70-90°, quickly followed by medial head of triceps dislocation at approximately 115°.

CONCLUSIONS: Abnormalities in triceps musculature are a rare cause of ulnar nerve compression neuropathy at the elbow. Failure to recognize the contribution of snapping triceps syndrome can lead to incomplete resolution or worsening of symptoms following cubital tunnel release and ulnar nerve transposition. Surgeons should be wary of this uncommon finding and adjust their operative approach accordingly.

Learning Objectives:

1. To identify a rare cause of ulnar nerve compression neuropathy at the elbow.

2. To modify the operative approach when faced with this unusual finding.

RP09

DEVELOPING A PATIENT-REPORTED OUTCOME INSTRUMENT FOR ADULT AND PEDIATRIC PATIENTS WITH SCARS: SCAR-Q

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PURPOSE: Millions of scars occur annually from surgical interventions and trauma. Scars impact psychosocial functioning with increased anxiety/self-consciousness, impair physical functioning and quality of life. A patient-reported outcome (PRO) instrument can highlight the impact of a particular disease on the patient?s psychosocial functioning, physical symptoms, appearance, and overall quality of life. In both the adult and pediatric traumatic and surgical scar populations, such comprehensive instruments do not exist and thus our aim was to develop one. Methods: We extracted all scar codes from qualitative datasets from adult surgical procedure groups and pediatric patients with facial differences. Data were compiled and coded to develop a conceptual framework covering PRO outcomes for scars and to populate a set of PRO scales.

RESULTS: A conceptual framework was developed that included 3 major themes: appearance, scar symptoms and quality of life impact. Item pool developed from patient codes included 1870 items from 274 adult patients spanning 11 surgical groups and 194 pediatric patients. Despite the large patient sample, only 15% of items in the item pool relate to pediatric patients. A PRO instrument called SCAR-Q was developed for adult patients with scars and is ready to field test. Qualitative interviews are being conducted with pediatric patients outside of facial plastic surgery to finalize the pediatric instrument to create a pediatric scar conceptual framework and set of PRO scales called SCAR-Q Kids.

CONCLUSIONS: With evaluations of surgery becoming more person-centered, a PRO instrument targeted for the surgical and traumatic scar

population is essential to adequately capture patient concerns and the impact of interventions on their lives. We anticipate that SCAR-Q Kids will be used to determine the crucial timing for scar modulation, measure patient outcomes, used in quality improvement initiatives, and aid in clinical trials.

Learning Objectives:

1. To describe a preliminary PRO instrument for the scar population; and

2. Highlight importance of PRO instruments for clinical trials, quality improvement initiatives, and outcome measures.

RP10

A HIGH-FIDELITY SURGICAL MODEL FOR ARCH BAR PLACEMENT

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PURPOSE: Many surgeons agree that arch bar placement is the gold standard in maxillary mandibular fixation. Existing training models for arch bar placement are low fidelity, and do not adequately replicate obstruction from soft tissues of the cheek, tongue and gingiva. We sought to develop an inexpensive, high fidelity arch bar simulator which includes these soft tissue structures.

METHODS: Computer tomography data was used to create a three-dimensional (3D) model of the mandible and maxilla including temporal mandibular joint (TMJ) and integrated table clamp. Both a fractured and non-fractured mandible was created. The bony models were constructed from plastic using 3D printing. Soft tissue structures were designed using 3D modelling software and fabricated from silicone and polyurethane.

RESULTS: A high fidelity arch bar surgical model that replicates both bony and soft tissue structures of the face, tongue and gingiva was developed. The model can be configured using either an intact or fractured mandible, with or without obstructing soft tissue structures. These modifications allow for varying difficulty as the student's skill level improves.

CONCLUSIONS: By providing an outlet for deliberate practice, this model may reduce operating room time spent teaching basics and maximize the benefit from actual cases. Further evaluation for validation and refinement of the model is currently underway.

Learning Objectives:

At the end of this presentation, the learner will be able to:

1. List the current limitations of arch bar surgical simulators;

2. Understand the benefits of a training model containing both skeletal and soft tissue structures; and

3. Identify the potential and value of 3D modelling and 3D printing techniques in surgical education.

RP11

NIPPLESAVE VIDEO: DEVELOPMENT AND VALIDATION OF A PATIENT EDUCATIONAL VIDEO TO INCREASE PATIENT KNOWLEDGE REGARDING NIPPLE-SPARING MASTECTOMY

J Platt*, T Cil, L Chan, S Hofer, T Zhong

Toronto, ON

PURPOSE: Lack of patient knowledge and concerns with the safety of nipple sparing mastectomy (NSM) may be factors that have influenced a lower than expected patient recruitment into a planned NSM RCT. Therefore, we designed an educational video to address this knowledge gap among patients eligible and considering NSM.

METHODOLOGY: We followed suggested criteria for development of patient educational tools. We used of multiple methods for expression of information (visual, audio and written), with lay language to convey information. We undertook patient educational needs assessment of laypersons and breast reconstruction patients to influence content. We established a protocol to evaluate acceptability and validity of our educational tool. Qualitative survey outcomes were used to further needs assessment and to establish acceptability. We modified a validated knowledge test to measure changes in knowledge before and after viewing the video. Lastly, we will measure the enrolment rates into our NSM RCT after introducing the educational tool into practice.

RESULTS: There were 5 diagrammed script revisions prior to video production. Overall reviews from the needs assessment were positive and our video contained most of the desired information. Needs assessment from laypersons focused on technical details of the video, such as colour contrasting, speed of narration and method of presentation of written material. Needs assessment from patients indicated more inclusive terminology and inclusion of multiple forms of media to convey information. Overall the video underwent 12 revisions to establish a preliminary final video that will be tested for acceptability, validity and efficacy.

CONLCLUSIONS: Educational tools can be an effective way to convey information and improve patient knowledge when appropriate steps have been taken to ensure that patient needs are assessed, the tool is validated and is acceptable to patients. We have developed an educational tool and established a protocol to ensure these principles are met.

Learning objectives:

1. Participants will be able to identify some barriers to execution of randomized controlled trials in a surgical setting;

2. Participants will be able to describe the benefits of multimedia education tools for surgical patient education;

3. Participants will be able to describe some of the steps required to validate an educational tool for surgical patient education.

DISCLOSURES: Funding from Acelity/Lifecell received to develop the NippleSAVE video.

RP12

TO BIOPSY OR NOT: SIMPLIFYING DIAGNOSIS OF OSTEOMYELITIS IN PRESSURE SORES

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PURPOSE: To develop an evidence-based protocol for diagnosis of osteomyelitis associated with pressure sores. Methods: The PubMed data base was searched with phrases "Osteomyelitis (MESH) + Pressure Ulcer (MESH)", "Osteomyelitis (MESH) + Pressure Ulcer (MESH) + + Bone Biopsy (free text)", and "Osteomyelitis (MESH) + Bone Biopsy (free text)". Two authors browsed the resulting abstracts to identify additional related articles for inclusion.

RESULTS: A variety of means of diagnosis of osteomyelitis in pressure sores (OMPS) have been described in the literature. These can generally be categorized as imaging- based modalities or bone biopsy. The literature is inconsistent, but in general, plain films lack sensitivity (as low as 18%), where as nuclear medicine bone scans lack specificity (50-59%). MRI offers excellent sensitivity (98%) and specificity (89%), but can be difficult to access expediently and is expensive. Bone biopsy is the gold- standard for diagnosis of osteomyelitis, but open biopsies may require additional soft- tissue incision or dissection in an area predisposed to poor wound healing. In contract, fine-needle bone biopsy has excellent sensitivity (87%) and specificity (93%). Discussion: Pressure sores are a major source of healthcare resource spending, and can be further complicated by underlying osteomyelitis. Other physicians looking after pressure ulcer patients will often attempt to diagnose OMPS based on the presence of exposed bone in a wound, superficial wound swabs or potentially inaccurate imaging modalities. Based on the limited literature evaluating the various methods of diagnosis of OMPS, fine-needle bone biopsy can be performed bedside with minimal resources, and provide accurate results.

CONCLUSION: Fine-needle bone biopsy is a straightforward tool in the diagnosis of OMPS that can improve clinical care and decrease unnecessary resource utilization.

Learning Objectives:

To review the various means of diagnosis of osteomyelitis in pressure sores and highlight the utility of fine-needle bone biopsy.

Groupe pour L'Avancement de la Microchirurgie Canada (GAM)

Abstracts presented at the 36th Annual Meeting / 36e Réunion annuelle

Dr Sheina Macadam: President / Présidente
Dr Edward W Buchel: Secretary / Secrétaire

G01

PREOPERATIVE COMPUTED TOMOGRAPHY ANGIOGRAM (CTA) DERIVED MORPHOMETRIC MEASUREMENT IS A VALUABLE RISK ASSESSMENT FOR BULGE FORMATION AFTER ABDOMINAL TISSUE BREAST RECONSTRUCTION

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Toronto, ON

PURPOSE: While studies have correlated abdominal muscle size with morbidity following major abdominal surgeries, this has not been evaluated for abdominal tissue breast reconstruction. We evaluated the ability of CTA-derived morphometric measurements of the patient's abdominal musculature anatomy to predict abdominal wall morbidity after free TRAM and DIEP surgery.

METHOD: A retrospective case control study was performed on 105 women (35 patients with bulge/hernia matched to 70 controls) who underwent free TRAM and DIEP flaps at Toronto University Health Network between 2009-2013. On the preoperative CTAs we measured the inter-rectus distance or rectus diastasis, the area and density of left and right psoas muscles and left and right rectus muscles at the umbilical level L4 using a 3D post-processing software (Aquarius iNutrition, Terarecon, CA). Multivariable logistic regression models were constructed to examine the effects of clinical preoperative risk factors (age, BMI, tobacco use, preoperative chemotherapy, prior abdominal surgeries), surgical factors (DIEP vs. free MS-TRAM, bilaterality) and CTA-derived measurements on bulge/hernia formation.

RESULTS: Univariable logistic regression analysis showed that none of the clinical preoperative risk factors significantly differed between the two groups. On the final multivariable analysis, we found that the most significant factors associated with bulge/hernia formation were decreased area of rectus muscle (OR 0.18, P<0.01) and increased inter-rectus distance (OR 1.14, P<0.01) as obtained from the patients' pre-operative CTA.

CONCLUSIONS: In addition to other purported benefits of preoperative CTA, obtaining objective measurements of patient's abdominal musculature anatomy may give both the surgeon and patient valuable information on risk of bulge/hernia formation following their abdominal based breast reconstruction.

Learning Objective:
At the end of this presentation, participants will be able to describe additional benefits of obtaining preoperative CTA in abdominal based breast reconstruction.

G02

PREOPERATIVE AND POSTOPERATIVE ASSESSMENT OF RECTUS ABDOMINIS MUSCLE SIZE AND FUNCTION FOLLOWING DEEP INFERIOR EPIGASTRIC PERFORATOR (DIEP) SURGERY

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PURPOSE: The DIEP flap is an excellent breast reconstruction option for post-mastectomy patients. Compared to its predecessor, the TRAM, this procedure has theoretical benefits of maintaining post-operative rectus abdominis (RA) function and minimizing abdominal wall morbidity. Prospective data for the anatomical and functional outcomes for the DIEP flap remains limited. We present the first study to prospectively evaluate the RA size and function post DIEP surgery in an effort to better quantify these theorized benefits.

METHODS: Patients undergoing unilateral DIEP breast reconstruction were recruited prospectively. Using CT scan, RA muscle thickness pre/post unilateral DIEP flap reconstruction were measured using the unaffected RA as an internal control. Additionally, dynamic ultrasound was used to evaluate post-operative muscle integrity and function. Circumferential, transverse and anterior-posterior measurements were used with each modality at standardized positions. BREAST-Q(C) was used to score patients' subjective satisfaction with both the reconstruction and their abdominal wall function. Clinical and radiographic hernia rates were also calculated.

RESULTS: Analysis revealed no significant differences in RA size pre and post DIEP procedure as compared to the unilateral control. Furthermore, on post-operative contraction, there were no significant differences in contractile thickness of the RA. BREAST-Q© revealed scores of 86 in overall satisfaction and 87 in abdominal wellness. There were no hernias noted on clinical or radiographic assessment.

CONCLUSIONS: The DIEP flap is an effective surgical procedure that is associated with no measurable loss in RA size or contractile function. Additionally, abdominal wellness and overall satisfaction scores for the procedure were high using the BREAST-Q© scoring system. No post-operative hernias were identified in this study.

Learning Objectives:
This presentation will enable the audience to make surgical decisions based on prospective data surrounding the benefits of the DIEP procedure. It will give clinicians the ability to counsel patients surrounding the abdominal wall outcomes related to their reconstruction.

G03

PATIENT-REPORTED OUTCOMES FOLLOWING DIEP FLAP BREAST RECONSTRUCTION: DOES INTERCOSTAL NERVE DAMAGE MATTER?

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PURPOSE: The DIEP flap is the current standard of care in autologous tissue breast reconstruction. Perforator dissection may require sacrifice of one or more intercostal nerves. There is little research regarding the effect of nerve damage on patient reported outcomes. We evaluated patient reported post-operative functioning as it related to intercostal nerve damage.

METHODS: This study is a case series including 80 patients who underwent abdominal based breast reconstruction with an SIEA (24), DIEP with all nerves intact (37) and DIEP with a nerve cut (19). All women completed a series of validated questionnaires pre-operatively and at 3 and 12 months post-operatively to assess physical well-being, the abdomen, pain, fatigue and physical functioning.

RESULTS: No statistically significant differences were detected between the three groups on demographics, pre-operative patient reported physical well-being, abdominal functioning, pain, fatigue,and physical functioning. Post-operatively there were no differences between the groups at 3 months or at 12 months in all of the above categories.

CONCLUSIONS: Ideally DIEP flap pedicle dissection results in no intercostal motor nerves sacrificed. Often total motor nerve preservation is not feasible to obtain suitable pedicle characteristics. In this study patient

reported outcomes of physical well being were not significantly different when zero or one intercostal motor nerve was sacrificed. This suggests that, if necessary to facilitate safe pedicle dissection, a single intercostal motor nerve can be sacrificed without compromising patient reported outcomes.

Learning Objectives:

To provide breast microsurgeons with information on patient reported postoperative functioning as it related to intercostal nerve damage in DIEP flap harvest.

G04

ONE VERSUS TWO VENOUS ANASTOMOSES IN FREE FLAP SURGERY: A SYSTEMATIC REVIEW AND META-ANALYSIS

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PURPOSE: To conduct a systematic review and meta-analysis to determine whether venous flap failure and reoperation rates are lower when two venous anastomoses are performed compared to one. The secondary objective is to determine, in cases where two venous anastomoses are performed, whether venous flap failure and reoperation rates are lower when the veins are from two different drainage systems.

METHODS: A comprehensive search of the literature identified studies comparing one versus two venous anastomoses in free flap surgery. Investigators independently extracted data on rates of flap failure and reoperation secondary to venous congestion. Methodological quality was assessed using the MINORS scale. A meta-analysis was performed; odds ratios (OR) were pooled using a random-effects model and 95% confidence intervals (CI).

RESULTS: Of 18,190 potentially eligible studies, 15 were included for analysis. The studies had a mean sample size of 287 patients (min=102, max=564). No statistically significant difference in venous flap failure was found when comparing one versus two venous anastomoses, OR 1.35 (CI 0.46-3.93). However, a significant decrease in reoperation rate due to venous congestion was shown, OR 3.03 (CI 1.64-5.58). Three studies compared free flaps with two venous anastomoses from different systems to those with two anastomoses from the same system. The results favour using two veins from two different systems, OR 0.16 (CI 0.02-1.27).

CONCLUSIONS: There is low-quality evidence suggesting that the use of two venous anastomoses in free flap surgery will lower the rate of reoperation due to venous congestion. There is insufficient data published to meaningfully compare outcomes of flaps with two venous anastomoses from different systems to flaps with anastomoses from the same system.

Learning Objectives:

Participants will learn the implications of:

1. Performing one versus two venous anastomoses in free flap surgery; and

2. Using a single versus dual venous drainage system (superficial and deep).

G05

QUANTIFYING INTERNAL MAMMARY VESSEL EXCURSION SECONDARY TO REGULAR RESPIRATORY AND CARDIAC MOTION DURING GENERAL ANESTHETIC, IN THE SETTING OF FREE TISSUE TRANSFER FOR BREAST RECONSTRUCTION

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PURPOSE: The anatomic location of the internal mammary vessels is a technical challenge in microsurgical breast reconstruction. This study aims to quantify the movement and depth of the internal mammary vessels when used as the recipient site during breast reconstruction surgery. This information will be used to validate an existing simulation model* which can be useful for microsurgical education.

METHOD: This is a prospective clinical study and retrospective chart review. Patients undergoing free flap breast reconstruction using internal mammary vessels as recipient were recruited. Intraoperative recordings of the dissected internal mammary vessels were taken and the depth of the vessels measured. Laterality, rib space, and vital signs were recorded. Measurements of the vessel excursion and the depth of the vessels are analyzed. History of radiation and BMI were gathered from the chart.

RESULTS: Data are available in 9 surgical sites (left 4, right 5). Three had previous radiation. Average vertical excursion during respiration is 3.44 mm (±1.01). The respiratory rate ranged from 9-14 breaths per minute. Cardiac motion was noticeable in 4 subjects, 3 were on the left side. Previous radiation, rib space, BMI, blood pressure, and heart rate, tidal volume, and respiratory rate show no correlation to excursion. The average depth of the vessels to the superficial surface of the mastectomy flaps is 4.56 cm, with a range from 4-5 cm.

CONCLUSIONS: Average vessel excursion is 3.44mm (2-5mm range) per respiration. There is a trend to suggest cardiac related motion is more likely to be present on the left side. This information will be used to calibrate the simulation model to create a realistic surgical space for microsurgical trainees.

Learning Objectives:

*To quantify the excursion and depth of internal mammary vessels in the setting of microsurgical breast reconstruction. *Simulation model developed by Dr Christian Petropolis (University of Manitoba, Winnipeg, Manitoba).*

G06

SAFETY OF IMMEDIATE BREAST RECONSTRUCTION FOLLOWING NEOADJUVANT CHEMOTHERAPY IN INFLAMMATORY BREAST CANCER

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INTRODUCTION: Indications for breast reconstruction surgery after breast cancer surgery are expanding. We hypothesize that immediate breast reconstruction is safe to perform in inflammatory breast cancer (IBC) patients following a good response to neoadjuvant chemotherapy.

METHODS: A retrospective chart review of all locally advanced breast cancer patients receiving neoadjuvant chemotherapy and surgery in Manitoba between January 2004 and December 2011 was done. Data gathered included demographics, breast cancer (site and type), surgery (date, type and contralateral procedure), reconstruction (type and timing), recurrence and mortality. Descriptive data analysis and Fischer Exact Test were used for statistical analysis.

RESULTS: A total of 199 patients with locally advanced breast cancer (LABC) were treated at our institution between 2004 and 2011 with curative intent, 71 (36%) were IBC. Thirty-two (45%) IBC patients developed recurrence and 39 (55%) died at last follow-up. Local recurrence occurred in only 1 patient. Fifteen (21%) of the IBC patients had breast reconstruction, including 10 (14%) that were performed at the time of definitive surgery. Breast reconstruction in this patient population did not negatively affect recurrence or mortality; (p=0.23) and (0.01) respectively. We further compared the outcomes of immediate breast reconstruction in all 199 LABC patients. Twenty-nine (15%) patients had immediate reconstruction. Eighty-two (41%) patients had recurrence and 89 (45%) died of any cause at last follow-up. Once again, there was no negative effect on recurrence or mortality; (p=0.42) and (0.034) respectively. There was a trend toward immediate breast reconstruction being protective against death, likely reflecting selection bias.

CONCLUSION: There is no increase in risk for locoregional recurrence or mortality in performing immediate breast reconstruction in IBC patients who have shown a good response to chemotherapy. This treatment option is routinely offered to appropriate patients in our center.

Learning Objectives:

To highlight the safety of immediate breast reconstruction in select patients with inflammatory breast cancer.

G07

THE OPTIMAL DISTAL RECIPIENT SITE FOR VASCULARIZED SUBMENTAL LYMPH NODE FLAP IN THE TREATMENT OF BREAST CANCER RELATED LYMPHEDEMA: DORSAL WIRST VS. VOLAR WRIST

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Purpose: The distal placement of vascularized lymph node is an effective method in the treatment of breast cancer related lymphedema. Although patients' major concerns are functional, we aim to optimize the outcome by

placing the vascularized lymph node in an acceptable recipient site. Our objective is to compare the functional improvement of the lymphedematous limb after the placement of the vascularized lymph node in the dorsal or volar wrist.

METHODS: An institutional and ethically approved prospective study for patients with obstructive breast cancer related lymphedema receiving submental vascularized lymph node to the volar or dorsal wrist with one year follow up. Functional outcomes of interest were the clinical improvement in limb circumference, incidence of cellulitis, and quality of life.

RESULTS: A total of 15 patients had the distal wrist as a recipient site, 7 in the dorsal and 8 in the volar wrist. The mean age, body mass index, and symptom duration were 54 years, 25 kg/m^2, and 29 months respectively. There was an overall significant downgrade of lymphedema and improvement of limb circumference, reduction in cellulitis incidence, and improvement in quality of life. Compared to the volar, the dorsal wrist recipient site had a significantly superior improvement in limb circumference and better quality of life in three out of the five domains.

CONCLUSIONS: Distal placement of vascularized lymph node in the treatment of breast cancer related lymphedema is effective. The dorsal wrist recipient site has a superior functional outcome. Both options should be discussed with the patient.

Learning Objective:

The attendees will be able to understand the concept of distal placement in vascularized lymph node transfer and appreciate the functional outcome measure in lymphedema surgery.

G08

THE LUMBER ARTERY PERFORATOR FLAP (LAP) CONUNDRUM - MANAGING A SHORT PEDICLE

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PURPOSE: The lumbar artery perforator (LAP) flap for breast reconstruction is useful to consider in those patients in whom abdominal based flaps are not an option. The flap offers reliable and good calibre perforator with significant flap volume. The main shortcoming of the flap is its short pedicle length. We discuss the various surgical options to alleviate this issue.

MATERIALS AND METHODS: The average pedicle length is short and attempts at gaining more pedicle length are fraught with complications. We present the six main options to combat this: a) Internal mammary vessels directly; b) Internal mammary vessels with a vein graft; c) Thoracodorsal vessels with a vein graft; d) Serratus anterior vessels directly; and e) Deep inferior epigastric (DIE) vessels as a pedicle (composite vein and artery graft).

RESULTS: All the above options have been utilized and are feasible. Facilitating anastomosis directly onto the internal mammary vessels is achieved by partial or complete costal cartilage removal at a lower interspace (3rd or 4th). Sites for vein grafts include the long and short saphenous veins in the lower limb. The DIE vessels can be harvested through a small phannenstiel incision. We present the clinical results from two centres (St Andrews, UK, and UZ Brussel, Belgium).

CONCLUSION: The free LAP flap provides ample tissue for breast reconstruction with a good calibre perforator. We present all the potential ways to overcome its short pedicle and advocate the use of the DIE vessels as an interpositional graft (Van Landuyt).

Learning Objectives:

1. Participants will be able to describe five different ways to overcome the short pedicle length of the lumbar artery perforator flap; and

2. Participants will appreciate why the authors favour the DIE vessels as an interposition vein and artery graft.

G09

IMAGING A SMILE: A NOVEL APPROACH TO MEASURING BRAIN ACTIVITY ACCOMPANYING FACIAL EXPRESSIONS AND ITS APPLICATION IN FACIAL NERVE PALSY

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PURPOSE: Understanding neuroplasticity and functional reorganization of the sensorimotor cortex following surgery for facial nerve palsy will allow for tailored post-operative therapies. Changes with facial and oromotor movements remain unstudied. Functional MRI produces artifacts, requires specific scan sequences and has low temporal resolution of the signal. Measurements obtained do not separate pre-movement activity, primary motor cortex, post-central cortex and are difficult to carry out in young children. The aims of this study are the following: Aim#1 To use a novel imaging technique (MASK-MEG) for measurements of neuroplastic changes in children Aim #2 To outline functional and structural mapping in a control group of healthy children Aim #3 To measure changes in sensory and motor cortex in patients undergoing reanimation surgery.

METHODOLOGY: Aim#1: 4 healthy participants were tested in the MASK-MEG system. Aim #2: Six healthy participants; 3 adults; 3 children (8, 10, 16 yo) underwent tasks in a 151-Channel MEG system with two electromyography (EMG) electrodes on left/right masseter muscles. These tasks included 50-100 cued facial movements, Left and right unilateral smiles, natural bilateral smiles and speech. Aim#3: Control and clinical patients underwent neuroplasticity mapping of their smile centre in a MASK-MEG system.

RESULTS: The MASK-MEG system is able to determine location of smile in the precentral gyrus in both adults and children. EMG is too 'noisy' in children and non-specific to smile. In children with facial nerve palsy, responses locations and trajectories are comparable to child control, but with less strong (and noisier) results. Motion differences can be seen between control and clinical participants.

CONCLUSIONS: We have demonstrated successful use of a novel MEG-compatible motion tracking device to measure brain activity of subtle facial expressions in children. EMG is highly non-specific for facial muscles due to the number of muscles within a small surface area and lacks ability to determine movement direction or amplitudes. The MASK system coils provide greater movement specificity and are small and light-weight enough not to impede on natural movements. MASK-MEG is a useful tool to assess location of smile in controls and patients with facial nerve palsy.

Learning Objectives:

1. To compare MEG, functional MRI and EMG in the context of facial nerve palsy; and

2. To evaluate the use of a novel device MASK-MEG for imaging a smile.

G10

MICROSURGERY TRAINING IN CANADA: A NATIONAL SURVEY AND LITERATURE REVIEW

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PURPOSE: Microsurgery is a technically demanding surgical skillset, where adverse events account for significant morbidity and mortality. While an integral component of residency training, currently there are no national recommendations on microsurgical curricula or outcome measurements. Simulated surgical training presents an opportunity to improve technical skills, operator confidence, and clinical outcomes. This educational model has been shown beneficial in other surgical fields; however there are no standardised microsurgery models in Canada. The goal of this study was to describe current trends in microsurgical teaching and satisfaction by surveying residents and fellows.

METHODS: Plastic surgery resident and fellow members of the Canadian Society of Plastic Surgery (CSPS) were administered a 26 question survey electronically. A total 218 surveys were distributed. Data was collected and analysed anonymously. In addition, a systematic literature review was conducted to identify articles describing microsurgical curricula, outcome measurements, and consensus opinions.

RESULTS: Response rate of 30% (66/218) included 12 of 13 Canadian residency programs. Preliminary results found microsurgical training varies significantly in frequency, duration, supervision, and models. Four institutions use 1 week introduction courses. Scheduled lab exposure ranges monthly to once per residency. 8 institutions have live animal exposure, and 5 institutions lack coupler device training. Despite variable training curricula, years of surgical training directly correlated to perceived competence (p=0.0007), and 83% of respondents viewed their microsurgical training positively.

CONCLUSIONS: While microsurgical training among Canadian plastic surgery programs varies significantly, there seems to be consensus that simulation improves competence and that overall satisfaction rates are comparable. Developing and implementing standardised microsurgical training curricula may provide an opportunity to better assess microsugical level and improve capacity of trainee surgeons.

Learning Objectives:

1. Participants will understand the current role and variations in microsurgery curricula; and

2. Participants will appreciate that standardization of microsurgical teaching is important for comprehensive competency-based training.

G11

NEW MICROSURGICAL TRAINING MODEL ALLOWING FOR OBJECTIVE MEASURES OF PSYCHOMOTOR SKILLS ACQUISITION

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PURPOSE: Microsurgery has a steep learning curve that requires dedicated practice and consistent feedback to attain competency. Structured scoring systems are conceptually simple to implement but are time consuming and subjective in nature. Eye tracking technology offers an objective measure of surgical skill but has not been applied in a real-time microsurgical setting due to technological constraints. Our study is the first to use eye tracking technology to monitor microsurgical psychomotor skill acquisition over time.

METHODS: Four residents, naïve to microsurgery, were asked to throw a single knot in a glove model. Each participant completed 18 trials over 6 sessions. For comparison, an expert microsurgeon completed 9 trials. Outcome measures included fixation and cognitive workload metrics. Using a simulated surgical microscope which allowed residents to visualize the microsurgical field on a 1080p monitor, fixation data was recorded through the Tobii X2-60TM system. Cognitive workload was measured using the modified surgical NASA-TLX score. Data were analyzed using repeated measures ANOVA.

RESULTS: 81 trials were recorded for 413 minutes of data. Trainees varied in initial ability and progressed at different rates. Of note, mean fixation duration and fixation counts decreased as naïve residents gained experience (0.91s to 0.24s, p=0.033, 25.2 to 5.04, p=0.049, respectively). NASA-TLX scores were significantly decreased over the course of the trial procedures (61 to 36, p=0.045). The expert microsurgeon achieved plateau performance within 3 trials.

CONCLUSION: Eye-tracking technology when applied to microsurgery offers insight into the psychomotor learning process. Differences in gaze behavior can be tracked as naïve microsurgeons become familiar with the setting and improve in skill.

Learning Objectives:

Participants will be able to describe:

1. Current subjective tools for microsurgical assessment;

2. Association of cognitive workload and performance; and

3. Role of eye tracking technology in monitoring microsurgical skill development.

G12

CLINICAL EXPERIENCE AND INDICATIONS OF FREE FLAP IN THE TREATMENT OF BURN NECK SCAR CONTRACTURES

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PURPOSE: In the last decades, advances in burn care have significantly improved the survival rate of patients with extensive burn injuries. Therefore, reconstruction procedures are necessary to improve long-term outcomes of post-burn scarring deformities. Neck contractures present special anatomical characteristics, which can be challenging for a reconstructive surgeon. Moreover, they may affect airway management during surgical procedures. Traditional methods such as partial and full- thickness skin grafts, local flaps, tissue expanders and skin substitutes have been used to release contractures and improve function. However, these techniques exhibit limitations to resurfacing of extensive scar areas. We present our experience with different free flaps for neck contracture release and resurfacing secondary to burn injury.

METHOD: Between 2005 and 2016, 7 free flaps were performed on burn patients with TBSA between 20 and 70% presenting with neck contractures at the University of Alberta Hospital. Three ALT flaps, 3 RFFF and one ulnar forearm flap were used to release neck contractures.

RESULTS: All 7 flaps reconstructions were completed with improvement of neck range of motion. Good aesthetic results were achieved with smooth contour. The overall patient satisfaction rate was good. However, several cases required secondary procedures such as flap defatting and liposuction to reach optimal results.

CONCLUSION: The scarring process and contractures affect the patients on a cosmetic and respiratory level, therefore having an impact on their psychological and functional quality of life. Consequently, cervical contractures can be considered a priority when planning reconstruction for a burn patient. Free flaps are now considered an important and reliable method for neck contracture deformity reconstruction following burn injury.

Learning Objectives:

At the end of this session the learner will be able to recognize the limitations of traditional treatment of neck contractures secondary to burn and to understand the advantages of free flaps for secondary burn reconstruction.

CSPS AUTHOR INDEX

GAM AUTHOR INDEX