Canadian Society of Plastic Surgeons | Société Canadienne des Chirurgiens Plasticiens

CANADIAN SOCIETY OF PLASTIC SURGEONS
SOCIÉTÉ CANADIENNE DES CHIRURGIENS PLASTICIENS

2020 ONLINE SCIENTIFIC PRESENTATIONS
PRÉSENTATIONS SCIENTIFIQUE EN LIGNE 2020

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GENERAL PODIUM SESSION

03

Skin-reducing mastectomy with immediate prepectoral reconstruction without dermal matrix: Surgical, aesthetic and patient reported outcomes

T Safran*, B Al-Halabi, A Viezel-Mathieu, T Dionisopoulos
Montréal, QC

PURPOSE: Prepectoral breast reconstruction is being increasingly popularized owing largely to technical advances. Patients with ptotic breasts and active cancer require mastectomies through a mastopexy excision pattern to achieve proper pocket control in a prepectoral single-stage operation. This article presents a single-surgeon experience with direct-to- implant, prepectoral reconstruction following skin-reducing mastectomies. **METHODS**: A retrospective chart review identified all patients undergoing prepectoral, DTI breast reconstruction following mastopexy-pattern from June 2016 to June 2018. Surgical and aesthetic outcomes including capsular contracture and revision surgery were measured. Breast-Q was administered pre-operatively, at six months and one year postoperatively. **RESULTS**: A total of 84 patients(121 breasts) were included. A widely based inframammary fold adipo-dermal flap was used in all cases, with acellular dermal matrix(ADM) used in 63.3 %(n=77) of breasts, free nipple grafts in 34.7%(n=42), and post-mastectomy radiation therapy(PMRT) in 26.5%(n= 31). Operative complications included NAC necrosis 5.1% (n=6), hematoma 3.4%(n=4), seroma 3.4%(n=4), implant exposure 2.6%(n=3) and infection 0.9% (n=1). Minor complications included cellulitis 6.0%(n=5) and minor wound issues 4.3%(n=5). In terms of aesthetic outcomes, only two non-radiated breasts experienced a grade 3-4/4 capsular contracture requiring capsulectomy. Rippling was visible in 3.4%(n=4) of breasts. Breast-Q showed high satisfaction with the technique with no significant differences with the use of ADM. **CONCLUSIONS**: In conclusion, this cohort represents the largest single surgeon, wise pattern DTI prepectoral database in the literature. This report showed that surgical and aesthetic complications did not differ in terms of ADM use. This technique has shown through patient-reported outcomes to yield high patient satisfaction postoperatively. **LEARNING OBJECTIVES:** 1. Participants will be able to compare ADM and non-ADM based reconstructions; 2. Participants will be able to see patient reported outcomes for this technique; 3. Participants will understand the rational behind the adipo-dermal vascularized coverage.

06

Cumulative operative time for autologous and alloplastic breast reconstruction: A comparative long-term analysis

B Bitoiu*, S Pripotnev, E Bovill, K Isaac, S Macadam
Vancouver, BC

PURPOSE: Limited studies exist comparing the longevity of autologous versus alloplastic breast reconstruction. Revision rates, outcomes and operative time are critical factors to consider when comparing options. This study compares autologous free flap and alloplastic breast reconstruction for cumulative operative time and number of total surgeries using minimum 3-year follow up. **METHODS:** A retrospective study design was employed. Patients that underwent mastectomy and breast reconstruction between 2009-2016 were included. Patients were grouped by type of reconstruction and then further divided into unilateral and bilateral reconstruction groups. Primary outcomes included cumulative operative time and total number of procedures. **RESULTS:** Average length of follow-up time was 5.1 years (range 3.0?10.8 years). For unilateral breast reconstruction, cumulative operative time was equivalent comparing autologous vs alloplastic (642 vs. 494 min, p=0.12), and there were fewer total procedures (2 vs. 5, p=0.009) for autologous reconstructions. For bilateral breast reconstruction, cumulative operative time was longer for autologous vs alloplastic (1017 vs. 370 min, p=0.0002) and there was no difference in number of total procedures (4 vs.3, p=0.244). **CONCLUSIONS:** For unilateral breast reconstruction an initial autologous procedure takes longer, but over time cumulative operative time is equivalent to alloplastic reconstruction, due to the higher number of revisional surgeries required in the alloplastic group. For bilateral breast reconstruction, cumulative operative time is longer for autologous reconstruction and total number of surgical procedures are the same when compared to alloplastic reconstruction. Unilateral alloplastic reconstruction is associated with higher cumulative operative time than bilateral alloplastic reconstruction due to additional revisions required to achieve symmetry with the non-cancer side. These results may be used to inform patients during the decision-making process. **LEARNING OBJECTIVES:** Review autologous versus alloplastic breast reconstruction.

07

Patient BIA-ALCL risk aversion in cosmetic and reconstructive plastic surgery practices

P Mankowski*, A Cherukupalli, E Bovill, P Lennox, N Carr
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PURPOSE: As the association between anaplastic large cell lymphoma (ALCL) and texture breast implants has promoted the recall of these devices, plastic surgeons have been contacting their patients to encourage them to present to clinic and discuss the next steps in management. Here we present the patient response to ALCL and profile the surgical goals of the reconstructive and cosmetic populations. **METHODS:** A retrospective review from two practices (1 reconstructive, 1 cosmetic) was performed of contacted patients with textured implants. The clinical records of these patients were analyzed for their presenting concerns, wait times, and definitive management plans. Statistical analysis was performed between practice types and odds ratios were computed to determine the predictive value of patient concerns with subsequent surgical management. **RESULTS:** A total of 418 patients with textured implants were reviewed. Of the patients who presented to clinic, 70% of the reconstruction cohort and 63% of the cosmetic cohort when on to be scheduled for implant removal or exchange. The reconstructive

population had a higher rate of ALCL concern (52%) but both cohorts had a significant odds ratio showing that an expressed fear of ALCL ultimately dictated surgical management (4.8 OR cosmetic, 11.6 OR reconstructive). Wait times for surgery were found to be on average 54 days longer for the reconstructive population.
CONCLUSIONS: Both reconstructive and cosmetic patients with textured implants have been seeking surgical care for implant removal at high rates. Although the risk of ALCL appears to be more concerning to the reconstructive population, both cohorts are equally motivated to seek surgical care. The improved access to surgery of the cosmetic patients allows them to more quickly meet their needs. **LEARNING OBJECTIVES:** 1. Participants will be able compare patient concerns with textured implants between reconstructive and cosmetic practices. 2. Participants will be able to describes management trends in BIA-ALCL risk aversion.

08

Immediate breast reconstruction surgery with expander /direct implant and use of acellular dermal matrix: does hormone therapy increase the risk of infection?
D Giaccone*, A El Khatib, O Doucet, G Dimitropoulos, A Danino
Montréal, QC

PURPOSE: is hormone therapy increasing the infection rate in patients undergoing breast reconstruction with implants and Acellular Dermal Matrix? **METHODS**: A prospective study was performed on patients undergoing breast reconstruction at the University of Montreal Medical Centre between 2013 to 2016. Patients were divided by the use of hormone therapy at the time of surgery. Complication rates, including infections, necrosis, seromas and hematomas, were compared and analyzed using univariate and logistic regression models. **RESULTS**: Among a total of 112 patients (183breasts), 58 patients (91 breasts) were receiving hormone therapy and 54 patients (92 breasts) were not. The hormone therapy group had a higher incidence of post-operative mastectomy skin infection (20.7% versus 7.4%; p= 0.0447) and necrosis (13.4 versus 9.26; p=0.454): however, statistically significant results were only present for infection cases. For the other complication: higher rates of capsular contracture (13.4 versus 9.26; p=0.196) and lower rates of seromas (5.17% versus 7.4%; p=0.625) and hematomas (1.72 versus 14.81; p=0.011) were found among the hormone therapy group. **CONCLUSIONS**: Hormone therapy was associated with a higher incidence of Infections after breast reconstruction with ADMs and implants. The authors propose an individualized approach to the preoperative cessation of tamoxifen or aromatase inhibitors. **LEARNING OBJECTIVES**: At the end of this lecture, we should start to identify hormone therapy as a possible factor in increased post-surgical infections in the context of breast reconstruction with implants and ADMs.

09

Facial distortion with smart phone photography: The implications for patient and surgeon perspectives
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Halifax, NS

PURPOSE: Smartphones have become ubiquitous for self-taken photographs and before/after images by surgeons. This has had an effect on perception of body features, resulting in increased demand for aesthetic procedures. This study aims to explore smartphone camera incurred distortions in facial features using common smartphones compared to professional DSLR cameras. **METHODS**: A model's face was imaged at average human armlength (75 cm) with the camera at level (0°) with the nose or, to simulate selfie angles, 30° above or below. Five cameras were compared including Nikon DSLR with 22 mm lens and front/back cameras of iPhone 8 and Samsung Galaxy X7. Cephalometric measurements using predefined anatomical landmarks were obtained from photographs. Average ratio values of cephalometric measurements were calculated and compared using t-tests holding DSLR as standard. **RESULTS**: Distortions were noted for all smartphone cameras tested. In general, vertically oriented anatomical features were more distorted than horizontal features. iPhone front/rear cameras and Samsung rear camera tended to cause compression of central facial features and broadening of periphery. Conversely, the Samsung front camera tended to make central objects larger and peripheral objects smaller. Extensive quantitative details of specific anatomical distortions are explored in depth in the complete results. **CONCLUSIONS**: Smartphones displayed distortions when taking selfies at level and above/below face. This suggests that smartphone cameras have intrinsic distortions, likely resultant of differing optics and inherent software-based corrections. We propose there may be an over-correction of the typical 'fish-eye' effect of smartphone lens leading to relative decreases in central facial features compared to peripheral. Awareness of these distortions are important to consider when patient requests are based around smartphone photographs. **LEARNING OBJECTIVE**: Provide surgeons and patients with awareness of facial distortions incurred using smartphone cameras. Aid in guiding surgeons/patients in making decisions surrounding facial procedures requested based on perception of smartphone images.

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Systematic review of reporting quality of economic evaluations in plastic surgery based on the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) Statement
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Hamilton, ON

PURPOSE: Economic evaluations in health are designed to inform decisions by estimating the cost and effect trade-off of two or more interventions. This review identified and appraised the quality of economic evaluation reporting in plastic surgery based on CHEERS Statement. **METHODS:** Electronic databases were searched: MEDLINE, EMBASE, The Cochrane Library, Ovid Health Star and Business Source Complete from January 1, 2012 to November 30,

2019. Data were extracted: type of economic evaluation (i.e. cost-utility analysis (CUA), cost-effectiveness analysis (CEA), cost-benefit analysis (CBA), cost-minimization analysis (CMA)), domain of plastic surgery, journal, year and country of publication. The CHEERS checklist (24 items) was used to appraise the quality of reporting. **RESULTS:** Ninety-two economic evaluations were identified. By type they included: CUA (10%), CEA (33%), CBA (4%) and CMA (46%). Breast surgery was the top domain (48%). The majority were conducted in the USA (61%) and published in Plastic and Reconstructive Surgery journal (28%). One third (33%) were published in the last 2 years. The average CHEERS checklist score was 15 (63%). The average CHEERS checklist score per type of evaluation was 19 (77%) for CUA, 17 (70%) for CEA, 13 (52%) for CBA and 14 (57%) for CMA. Least reported CHEERS checklist items included: time horizon (15%), discount rate (18%) and assessment of heterogeneity (15%). Thirty-seven percent of studies were inappropriately titled. **CONCLUSION:** The quality of economic evaluation reporting is suboptimal. Over one third of published economic evaluations are wrong. The CHEERS checklist should be consulted when performing and reporting economic evaluations. The CUA should be the preferred economic evaluation analysis. **LEARNING OBJECTIVES:** 1. To explain the role of economic evaluations in comparative plastic surgical interventions. 2. To understand the different types of economic evaluations. 3. To appreciate the importance of reporting economic evaluations based on the CHEERS Statement.

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Pregnancy and parental leave among plastic surgery residents in Canada: a nationwide survey of attitudes and experiences

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Hamilton, ON

PURPOSE: Training in plastic surgery residency often occurs during childbearing years. Pregnancy and/or parental leave during residency can be complicated and is affected by training program policy, peers, supervisors and personal preference. The goal of this survey was to better understand the experiences and attitudes surrounding pregnancy and parental leave for Canadian plastic surgery residents. **METHODS**: Two surveys were developed to assess resident and staff attitudes and experiences with pregnancy and parental leave during residency. Following a pilot study, the surveys were electronically distributed to plastic surgery residents/ recent graduates and staff registered with the Canadian Society of Plastic Surgeons. **RESULTS**: The response rate was 49% and 33% for the resident/recent graduate and staff surveys, respectively. 21% of female residents, and 18% of female staff reported having a child during their residency. Of the residents who reported pregnancies, 42% reported pregnancy-related complications and 92% took maternity leave. 55% of female residents reported having to complete residency-related duties while on maternity leave and 29% of male residents who took parental leave reported returning to clinical duties earlier than planned. Half (55%) of residents reported hearing negative comments regarding pregnancy or parental leave during training from staff or colleagues. **CONCLUSION**: The rate of pregnancy and parental leave during residency has increased over time. Program specific policies and mentorship can potentially help address challenges related to service coverage, residency training requirements and accommodating pregnancy and parental leave for plastic surgery trainees. **LEARNING OBJECTIVES**: 1. Learn about the incidence of pregnancy, complications, perception of support and characteristics of parental leave among Canadian plastic surgery trainees. 2. Learn about the challenges and pressures experienced by Canadian plastic surgery trainees related to pregnancy and parental leave. 3. We hope this presentation will jump-start a dialogue and action on this complex, sometimes controversial, and important topic.

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A systematic review of traumatic lower limb reconstruction comparing free muscle flaps and free fasciocutaneous flaps

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PURPOSE: Free flap reconstructions following lower limb trauma often suffer higher complication rates than other areas of the body. This review assessed the literature comparing the use of muscle or fasciocutaneous free flap reconstruction in these injuries and the associated complications. **METHODS:** An online systematic review of Embase, MEDLINE, Pubmed, and the Cochrane registry from inception to July 31, 2019 was completed. Study quality was assessed using the methodological index for non- randomized studies (MINORS) scale. **RESULTS:** Eight retrospective studies were included. The mean sample size of 233.8. Results indicate that there was no significant difference in complication rates, limb salvage rates, osteomyelitis, time to fracture union, partial flap failure, total flap failure, or time to functional recovery between the two free flap groups. **CONCLUSIONS:** The studies assessed in this review indicate comparable rates of complications between muscle free flaps and fasciocutaneous free flaps for lower limb traumatic reconstruction. **LEARNING OBJECTIVES:**
1. Participants will be able to describe common free flap reconstructions for lower limb injuries. 2. Participants will be able to identify if there are advantages of one flap type over another.

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Upper extremity functional recovery in cervical spinal cord injury: Implications for nerve transfer surgery to restore function

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PURPOSE: Functional gains can occur for years after spinal cord injury (SCI), but nerve transfers are time-sensitive due to irreversible muscle denervation. Spontaneous motor recovery and activity independence after SCI will impact the options for reconstructive surgery. This study evaluated improvement in upper limb motor strength and functional independence in cervical SCI.

METHODS: The European Multi-center Study about SCI dataset which includes motor function recovery for SCI level C5-C8 was reviewed. Data on feeding, bladder management and transfers (bed to wheelchair) were compared at 6 and 12 months. Subgroup analyses were performed: symmetric vs. asymmetric SCI; complete vs. incomplete SCI; age; and gender. **RESULTS:** From 6 to 12 months post-SCI, few patients recovered additional (MRC4-5) function below the motor level. Of individuals without elbow extension (C7) at 6 months (n=402 limbs), 3% gained MRC4-5 function and 8% gained MRC3 function by 12 months. Of individuals without finger flexion (C8) at 6 months (n=519 limbs), 3% gained strong finger flexion by 12 months. Participants with incomplete SCI injury had significantly better recovery than complete SCI. There was no significant increase in activity independence after 6 months (n=299). Feeding with assistive devices was reported by most patients with strong wrist extension (C6). Feeding and bladder management independence was found with strong finger flexion (C8). Elbow extension (C7) did not uniformly result in transfer independence. **CONCLUSION:** There were no significant gains in motor strength or functional independence after 6 months post SCI. Therefore, nerve transfers to gain function at 6 months post SCI should be considered. The expected functional range from this study will guide expectations for independent self-care. **LEARNING OBJECTIVES:** 1. Understand recovery after SCI and implications for future upper limb reconstruction.

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Biomechanical comparison of tendon-to-tendon attachment constructs for tendon reconstructions and transfers

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London, ON

PURPOSE: Early active rehabilitation therapy for tendon repair, transfer or reconstruction has improved outcomes in these patients. However, tendon repair constructs must be able to withstand mobilization in the immediate postoperative period and maintain sufficient excursion to resist rupture and restrictive adhesion formation. The purpose of this study was to compare the strength, bulk and frictional resistance of common tendon weave constructs. **METHODS:** A biomechanical study was performed utilizing 80 cadaveric lower extremity tendons to compare four common tendon weave constructs, the 3-pass, Pulvertaft (PT); end-weave (EW); single-pass, side- to-side (SP-STS); and simple, side-to-side (STS) attachments. The main outcomes investigated included tendon morphology, frictional force, measured in a novel tissue simulator, and the strength of the different constructs by linear loading with a tensile testing machine. **RESULTS:** A total of 40 tendon pairs, 10 per repair group were biomechanically evaluated and outcomes were compared. There were no significant differences in the native tendon (p=0.334) and repair site (p=0.564) cross-sectional area, and no difference in the added bulk of the repair (p=0.663) between the repair groups. Frictional resistance was not significantly different between the groups. The SP-STS repair was significantly stronger, stiffer, and exhibited less displacement compared to the other constructs. **CONCLUSION**: The SP-STS with a running Krackow suture was significantly stronger, without a significant difference in bulk and frictional resistance compared to the PT, EW, STS repairs. The SP-STS is the optimal repair construct for use in tendon transfers and reconstructions to permit early active mobilization. **LEARNING OBJECTIVE:** 1. Understand the importance of repair type for tendon to tendon constructs in terms of bulk, strength and a novel friction resistance model.

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Utility of ultrasonography and significance of surgical anatomy in the management of De Quervain's disease: A systematic review and meta-analysis

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PURPOSE: The role of ultrasound in plastic surgery practice has grown significantly over the past decade, with notable applications for conditions of the upper extremity. Its utility for the management of De Quervain's disease (DQV) however remains to be established, and the prevalence of first dorsal compartment (FDC) anatomic variations adequately assessed. **METHODS**: A systematic review was performed to evaluate the role of ultrasound in the diagnosis, anatomic characterization and clinical management of DQV. A meta-analysis was conducted to establish the prevalence of FDC anatomic variations in the DQV and general population, along with the diagnostic accuracy of ultrasound for their detection. Outcomes following ultrasound- guided therapies were documented and compared to alternative treatment options. **RESULTS**: Extensor retinaculum thickening, tendon sheath swelling, peritendenous edema and tendon enlargement were identified as the most common sonographic features of DQV. The prevalence of an intercompartmental septum in the DQV surgical population was shown to be significantly greater than the general cadaveric population, (67% vs. 35%, respectively); ultrasound demonstrated a 95% sensitivity and 96% specificity for its detection, with comparable diagnostic accuracies between surgeon and radiologist sonographers. While the efficacy of energy-based therapeutic ultrasound remains elusive, ultrasound-guided corticosteroid injections were shown to be more accurate than manual injections (90- 100% vs. 40-100%), and to confer significantly better treatment outcomes (73-100% vs. 59-83% success rates, respectively). **CONCLUSIONS**: Ultrasound use is essential to achieve the best evidence-based outcomes in the management of DQV; the varied prevalence of FDC anatomic variations in the DQV population, and high accuracy of ultrasound for their detection, carry significant prognostic implications. **LEARNING OBJECTIVES**: 1) To evaluate the diagnostic and therapeutic utility of ultrasonography in the management of De Quervain's disease; 2) To determine and compare the incidence of anatomic variations of the first dorsal compartment in the De Quervain vs. general population

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Comparing dental occlusion outcomes in cleft lip and palate patients with different presurgical orthopaedic devices

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London, ON

PURPOSE: The purpose of this study is to review unilateral cleft lip and palate cases in a single surgeon's practice to see the effects of an active, passive, or no presurgical orthopaedic (PSO) device on dental occlusion over a 10-year period. **METHODS:** The effect of PSO devices on long-term dental occlusion in cleft lip and palate patients is highly debated. At our institution, a single surgeon has used either an active or passive PSO device for over 15 years while maintaining a standardized protocol for cleft lip and palate repair. A comparison over a long-term period can therefore be made between patient groups based on what type of device was used. All patients with unilateral cleft lip and palate in a single surgeon's practice were included. Patient charts were reviewed for basic demographic information and initial alveolar gap sizes. Occlusion was graded using the Goslon Yardstick classification system on 3-D patient molds. **RESULTS:** Ninety-six patients were included; 39 active device, 30 passive device, and 27 patients without a device. Average initial horizontal alveolar gap measurements were: 6.2mm, 6.1mm, and 2.7mm respectively. Goslon Yardstick scores at 5 and 10 years were not significantly different between groups ($p=0.779$, $p=0.487$).
CONCLUSIONS: To date, contradictory data exists in the literature regarding dental occlusion in cleft patients who receive PSO device treatment. This study has controlled for certain confounding variables such as different surgical protocols and surgeons which limit the validity of current literature on this subject. Based on the findings of this study, there were no occlusal differences between patients receiving either active, passive, or no PSO device at 5 or 10 years of age. **LEARNING OBJECTIVES:** 1. Understand the use of active and passive PSO devices in cleft lip and palate management. 2. Recognize that dental occlusion is not adversely affect by the use of PSO devices.

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The unilateral cleft lip nasal deformity (uCLND) revisited: uncovering fundamental misconceptions using 3D image analysis

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PURPOSE: The purpose of this study was to develop a model of the uCLND based upon objective 3D analysis of infants with unrepaired cleft lip. **METHODS**: We assessed landmark displacements, anthropometric dimensions, and shape-base measures on 100 subjects whose images were captured at 6 months of age using 3D stereophotogrammetry. Lateral displacement of subnasale (sn) had the greatest magnitude aberration of any measure and was therefore used as the independent variable in a linear regression analysis model. Significant changes were assessed by ANOVA. **RESULTS**: For each 1 mm displacement of sn we found that ($p<0.05$): The non-cleft alar base moves 0.8 mm lateral, the cleft alar base migrates 0.6 mm posterior, and the columella tilts 4.2°. The nasal dorsum follows sn deviation swinging 1.8° towards the non-cleft side. While the cleft nostril widens (+1.1 mm), the non-cleft nostril narrows (-0.2 mm). All of these changes are associated with collapse of the cleft side dome and elevation of the non-cleft hemi-tip as measured by progressive changes in the nose-tip-volume-ratio (+0.15) and alar-cheek-angle-ratio (+2.09). In addition to nose changes, we found that while the cleft medial lip height shrinks (-0.2 mm), the non-cleft medial lip height grows (+0.2 mm) and that the inter-endocanthal distance widens (+0.4 mm). **CONCLUSIONS**: The spectrum of uCLND can be modelled using deviation of sn as a progressive measure of severity. Our findings contradict dogma (the cleft alar base does not deviate lateral and the nasal dorsum does not deviate towards the cleft) and clarify nasal changes that result in the deformity. Objective analysis and a better understanding of the uCLND is critical in devising better methods of treatment. **LEARNING OBJECTIVES**: Participants will be able to describe nasolabial changes that occur with the uCLND, define objectives of treatment, and recognize inconsistencies of previous descriptions.

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Outcomes and complications of the Mustarde otoplasty: a "good-fast-cheap" technique for the prominent ear deformity

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Vancouver, BC

PURPOSE: The Mustarde otoplasty is a commonly used procedure for the correction of the prominent ear deformity. Complication rates related to suture extrusion and long-term outcomes are variable in literature. The study's purpose was to examine the efficacy and safety of the Mustarde otoplasty and its resource utilization, using an "iron triangle" methodology incorporating quality, time, and cost. **METHODS**: Retrospective data was collected on patients under 18 who underwent primary Mustarde otoplasty between 2009-2018. Patient demographics, intraoperative details, complications, follow-up, and satisfaction scores were collected and analyzed.
RESULTS: There were 119 Mustarde otoplasties performed on 68 patients, with a median follow-up of 72 weeks (24-476 weeks). Fifty-one of the 68 patients underwent bilateral procedures and 110 (92%) were performed for prominent ear. The median operative time was 95 minutes (31-133 minutes), translating to a case cost of $2046. A total of 24 complications were reported in 17 patients. Minor complications included: Suture extrusion (n= 20), hematoma (n=1), and suture abscess (n=1). Major complications included reoperation (n=2). The series had a revision rate of 1.7% (n=2). No additional procedures were documented at other hospitals in the province. The majority (97%) of ear outcomes demonstrated both patient and surgeon satisfaction. **CONCLUSIONS:** The Mustarde otoplasty demonstrated high efficacy in the correction of prominent ear, with low reoperation rates and high patient and surgeon satisfaction. The procedure demonstrated intriguing results in resource utilization, with brief operative times, "knife and fork" supply chain, and minimal overall costs. This operation provides a good, fast,

and cheap outpatient technique. **LEARNING OBJECTIVES:** 1. Elucidate efficacy and safety profiles of the Mustarde otoplasty in clinical practice and highlight its overall resource utilization. 2. Provide guidance in the implementation of the Mustarde otoplasty amongst otoplasty techniques.

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Measuring strength after peripheral nerve trauma. Is hand-held dynamometry a useful tool?
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Ottawa, ON

PURPOSE: To determine the utility of hand-held dynamometry as a tool to monitor motor recovery following peripheral nerve injury. **METHODS**: This was a prospective, randomized, and blinded observational study conducted with institutional Research Ethics Board approval. Patients with acute upper extremity peripheral nerve injury were recruited from the Ottawa Peripheral Nerve Trauma Clinic. Strength was measured using a hand-held dynamometer (HHD) by 3 examiners, a Plastic Surgeon, a Physiatrist and a Physiatry Resident. Intra-rater and inter-rater reliability were measured using the intraclass coefficient (ICC) for the involved and uninvolved arms. Average strength measured by the HHD was also compared to Medical Research Council (MRC) grading, electromyographic data and patient-reported function to assess correlation at baseline and follow-up. **RESULTS**: In the involved and uninvolved arm, the ICC revealed good to excellent intra-rater reliability for each examiner when the HHD was used to test strength in shoulder abduction and wrist extension, ranging from 0.88 to 0.98. Inter-rater reliability between the three examiners was good to excellent in the involved arm for shoulder abduction and wrist extension, with the ICC ranging from 0.77 to 0.90. Overall, inter-rater reliability was lower in the uninvolved arm, with the ICC ranging from 0.65 to 0.82. **CONCLUSIONS**: Hand-held dynamometry can be regarded as a reliable adjunct for strength measurement following upper extremity peripheral nerve injury. By providing quantitative and continuous strength data, it may improve the ability of clinicians to monitor motor recovery, and thereby, aid in decision making around management. This tool appears to be more reliable when neurogenic weakness is present, which we hypothesize is related to difficulty with stabilization of an uninvolved limb during isometric contraction. Overall, this technique adds an objective strength assessment, which may be useful given that MRC grading has been recently called into question. **LEARNING OBJECTIVES**: 1. Appraise the current tools available for monitoring motor recovery following peripheral nerve injury 2. Decide whether hand-held dynamometry is a useful adjunct for measuring motor recovery in this population

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Optimization of skin substitutes grafting on the murine model inspired by the plastic surgeon's practice
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PURPOSE: The laboratory mouse remains the model of choice for wound healing studies and for human skin substitute grafting. The use of this model for reconstructed skin transplantation is limited by complications that may compromise the adhesion and neovascularization of the graft. The objective is to assess the efficacy of a new grafting method, inspired by the practice of the plastic surgeon, to increase the stability of the graft. **METHOD:** Skin substitutes produced by the LOEX's self-assembly approach were grafted onto mice by using the conventional method, or optimized, which includes the addition of intramuscular sutures and bolus dressings. The grafts were removed between 10-21 days, then compared by macroscopic and histological analyses. The grafts area was calculated with Image J software from photos taken at different postoperative times. **RESULTS:** The new method prevents 100% of losses of grafts by adhesion defect. It reduced displacement (49%) and contraction (87%), which resulted in 50% larger grafts compared to skin substitutes grafted with the usual method. **CONCLUSIONS:** Improving the method lead to obtaining grafts of a larger area and of better quality, which improves reproducibility and facilitates postoperative analyzes. This method is a model of choice for the in vivo study of long-term skin substitutes to test new therapies and to model skin pathologies. **LEARNING OBJECTIVES:** After this presentation, participants will be able to identify the problems encountered during the in vivo study of skin substitutes, to describe the characteristics of the new grafting method adapted to this model and to understand the positive repercussions of this approach in research.

RESIDENTS CORNER

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Impact of fronto-orbital and lateral orbital wall advancement on orbital volume and shape in non-syndromic metopic craniosynostosis
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PURPOSE: Metopic craniosynostosis occurs in approximately 25% of non-syndromic craniosynostosis cases. Periorbital dysmorphology includes hypotelorism, lateral orbital wall recession and trapezoidal shape to the orbital perimeter. This study's objectives were to quantify orbital volumetric and shape changes perioperatively after performing fronto- orbital advancement (FOA) with lateral orbital wall advancement, and compare differences between the orbital morphology of children with non-syndromic metopic craniosynostosis and healthy age-matched controls. **METHOD**: This retrospective case series included non-syndromic metopic craniosynostosis

patients who underwent FOA with lateral orbital wall advancement over a 10-year period by a single surgeon. Pre and post-operative orbital volume and morphology were measured via CT scans using a three-dimensional (3D) segmentation software. Pre- operative orbital measures were compared to a cohort of healthy controls (ages 8-12 months). Descriptive statistics were performed. **RESULTS**: A total of 39 children were included with an average age at surgical time of 1.02 (±0.49) years. Statistically significant increase in bilateral orbital volume were obtained peri-operatively (right 14,111±2,206 to 16,857+2,126 mm3, $p<0.001$ and left 13,927±2,167 to 16,603±2,184 mm3, $p<0.001$). Similarly, increases were obtained in peri- operative interzygomaticofrontal suture distances ($p<0.001$), lateral wall length ($p<0.001$), and angle between the lateral wall to the Frankfort horizontal plane ($p<0.001$). When comparing pre-operative metopic craniosynostosis (n=34) orbital measurements with a cohort of healthy controls (n=31), orbital volumes were not statistically different, but the lateral wall length ($p<0.001$) and interzygomaticofrontal suture distances ($p<0.001$) were significantly smaller in the craniosynostosis cohort. **CONCLUSIONS**: Beyond cranial vault reshaping and expansion with FOA in non-syndromic metopic synostosis, the surgical correction of the orbital dysmorphology showed improvements in morphometric outcomes, as assessed by orbital volume and perimeter shape. Further volumetric and morphological analyses are needed to assess long-term outcomes. **LEARNING OBJECTIVE**: To understand key orbital measurement changes peri-operatively in non-syndromic metopic craniosynostosis children after FOA with lateral orbital wall advancement.

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Prevention of autologous costal cartilage graft warping in secondary rhinoplasty: A systematic review

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PURPOSE: The objective of this study is to systematically evaluate current interventions to prevent warping of autogenous costal cartilage grafts (ACCG) and to assess long-term outcomes with their use. **METHODS**: A systematic review was undertaken using a computerized search. Eligible articles assessed adult patients undergoing secondary rhinoplasty with ACCGs. Interventions to reduce warping were examined. Publication descriptors were extracted, heterogeneity was examined, and methodological quality of articles was assessed. **RESULTS**: Eighteen studies were included. Most studies were published after 2010 (83.3 percent), assessed a single intervention (83.3 percent), and were of levels of evidence III and IV. Mean patient age was 30 (range 5 to 95 years) and studies included a mean of 64 cases (range 9 to 357). Nine of the 15 non-comparative studies were considered of high methodological quality, while all three comparative studies were considered high quality. Secondary rhinoplasties which did not describe a method to address warping showed increased rates of warping compared to counter balancing techniques, chimeric grafts, titanium microplating, Kirschner wire and suture usage, irradiation, and various carving techniques. Rates of warping remained low with no major complications with the use of a variety of approaches. **CONCLUSIONS**: ACCG warping during secondary rhinoplasty can be alleviated with a variety of techniques with no clear difference in outcomes between approaches. Plastic surgeons may consider adopting one of the various techniques described in order to reduce warping, maximize aesthetic outcomes, and patient satisfaction. **LEARNING OBJECTIVES**: 1) Understand the various techniques to reduce cartilage warping during secondary rhinoplasty. 2) Learn how to improve cosmetic outcomes during secondary rhinoplasty with ACCGs.

23 – Second Prize for a presentation on an Innovation topic by a Resident

Introduction of a novel type of surgical simulation: 3D-printed step-specific simulation (S2Sim) for rhinoplasty

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PURPOSE: Surgical simulation traditionally comprises complete modelling of an anatomical site. The purpose of the present research was to develop the ability to simulate isolated anatomical components of a rhinoplasty operation to maximize simulation efficiency and cost-effectiveness. The authors present the technical development of step-specific simulation (S2Sim) for rhinoplasty utilizing 3D printing technology. **METHOD**: A CT scan of the nasal area was used to develop the platform and modeling for 3D printing of the nasal bones, upper lateral cartilages, lower lateral cartilages and septum. Various materials compatible with 3D printing were tested for optimal simulation. The individual components of the simulator were evaluated for feel/realism/handling of the materials, and ability to accurately perform five rhinoplasty procedures. **RESULTS**: Rigur 450 and Tango Plus resin mix selected for optimal realism of nasal cartilage was successfully 3D printed to create the cartilage complex. Realism of the various rhinoplasty components (upper/lateral cartilages, septum, facial bone and skin) was rated 4/5. The ability to perform a nasal osteotomy (4/5), cephalic trim (3.7/5), mark a caudal septum excision (3.7/5), perform domal sutures (3.7/5) and perform an alar base modification (4/5) were also scored. **CONCLUSIONS**: Optimal materials to simulate nasal components were identified and a technique successfully developed to allow their accurate modeling and 3D printer production. Realism and ability to carry out surgical maneuvers was found to be very good and amenable to surgical simulation for rhinoplasty. The novel concept of S2Sim produced by 3D printing has significant potential to be more efficient and cost-effective for simulation needs. **LEARNING OBJECTIVES**: 1. Understand the novel concept of step-specific simulation (S2Sim) and how this may improve efficiency and cost-effectiveness of surgical simulation.

24 – First Prize for a presentation on a Clinical topic by a Resident.

A randomized control trial comparing surgical and patient-reported outcomes between Alloderm and Dermacell in immediate alloplastic breast reconstruction

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PURPOSE: Alloderm and Dermacell are the two leading human acellular dermal matrices (ADM) in immediate breast reconstruction. Despite differences in physical properties including sterility, there are no comparative trials to date comparing surgical and patient-reported outcome measures (PROM) between the two products. A randomized clinical trial was designed in order to determine if there was a clinical difference between the two products. **METHODS**: A single center, open-label, RCT of patients undergoing ADM-assisted immediate breast reconstruction with an implant for breast cancer was performed. Patients were randomized to receiving either Alloderm or Dermacell. Primary outcomes were postoperative seroma (measured by duration of postoperative drain placement) and PROM's (measured by BREASTQ). **RESULTS**: Sixty-two patients were randomized, 31(50%) Alloderm and 31(50%) Dermacell. PROM data was available for 74% of Alloderm 87% of the Dermacell patients. Baseline patient and surgical characteristics were similar. Median duration of drains was 10 days for Alloderm and 8 days for Dermacell (p=0.20). At 6 months, a significantly higher number of patients with Alloderm required revisional surgery (30.3% vs 8.6%;p=0.031). The incidence of other secondary outcomes were similar and non-significant between groups (seromas requiring aspiration(3.0% vs 11.4%), implant loss (6.1% vs 2.9%), infection (9.1% vs 2.9%), red breast syndrome(3.0% vs 2.0%), p>0.05) At 3 months, the Alloderm group had a significant improvement in breast satisfaction (67 vs 53, p=0.03), overall satisfaction (85 vs 61, p=0.003) and satisfaction with surgeon(89 vs 67, p=0.01). At 12 months, there were no significant difference in PROM's between groups(p>0.05). **CONCLUSION**: We report the first randomized controlled trial to date comparing surgical and patient reported outcomes of the two most commonly used ADMs in immediate breast reconstruction in Canada. Although long term patient reported outcomes were not different between the two groups, patients who received Alloderm had high short term satisfaction rates, despite the increased risk of revisional surgeries. **LEARNING OBJECTIVES**: Compare the surgical and patient reported outcomes between Alloderm and Dermacell in immediate breast reconstruction

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Developing a 3D bio-artificial tissue model for breast capsular contracture

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PURPOSE: Breast capsular contracture is an unpredictable and difficult complication in implant-based breast reconstruction. There is a paucity of human pre-clinical models for capsular contracture. The objective of this study is to develop a 3D bio-artificial tissue (BAT) model of capsular contracture and test the efficacy of an anti-fibrotic RHAMM function blocking peptide (NPI-110). **METHODS:** Capsular tissue samples from seven patients undergoing capsulectomy or implant exchange were collected and classified according to Baker grade. Capsular tissue was sectioned and incubated in DMEM media to allow outgrowth of primary fibroblasts. The FlexCell TissueTrain system was used to create bio-artificial collagen-1 tissue cords. 3 x 105 primary fibroblasts from grade 1 and grade 4 cells were embedded into each cord and contraction measured over 14 days. Contracture was then measured over 14 days with the application of 20uM of peptide NPI-110 on day 0 and then 5uM on days 4 and 8 in grade 1 and grade 3 primary fibroblast-embedded cords. **RESULTS:** The BAT model reproduces the increased contractility of grade 4 fibroblasts, which demonstrate ongoing cord contractility over 14 days. Grade 1 and 4 cells contract to 50% of control cords by day 2. Grade 4 cells demonstrate ongoing contraction until day 14, whereas Grade 1 cells plateau after day 9. Peptide testing did not demonstrate any statistically significant difference between Grade 1 and Grade 3 cells, with or without treatment. **CONCLUSIONS:** The bio-artificial tissue model accurately replicates enhanced contractility of grade 4 capsular fibroblasts and presents a robust pre- clinical model with applications in future anti-fibrotic peptide testing and personalized medicine. **LEARNING OBJECTIVES:** 1. Understand the clinical utility of a bio-artificial tissue model for capsular contracture

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Predictive value of 3D imaging to guide implant selection in immediate breast reconstruction

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PURPOSE: Pre-operative estimation of breast mound volume for immediate breast reconstruction is necessary for operative planning, especially in direct to implant reconstruction. Our purpose was to investigate the relationship between pre-operative predictions of breast mound weight from 3D imaging and actual mastectomy weight and implant size. **METHOD:** All patients who had previously undergone nipple sparing mastectomy by a single surgeon were included. Pre-operative 3D images were reviewed and calculations of breast mound weight were performed by three independent reviewers. Intra-operative mastectomy weight and final implant weight were collected from patient charts. A regression analysis between calculated and actual values was performed. **RESULTS:** A total of 59 reconstructed breasts were included in the study population. Pre-operative 3D imaging-guided breast weight calculations were similar across reviewers (R=0.96). Pre-operative calculations of breast weight were 49.3 ± 131 g smaller than actual mastectomy specimens. Mastectomy specimens were 34.8 ± 138 g smaller than final implant sizes. Mastectomy weight and final implant size had linear relationships with pre- operative calculations of breast weight. Formulas for predicting mastectomy weight (mastectomy weight = 0.95

(calculated weight) + 63.2) and implant size (Implant weight = 0.56 (calculated weight) + 209.7) from pre-operative calculations of breast weight were generated. **CONCLUSIONS:** Pre-operative 3D imaging can be used to guide implant selection in immediate breast reconstruction. Final implant size was heavier than intra-operative mastectomy weight and predicted breast mound weight. **LEARNING OBJECTIVES:** 1. Listeners will be able to describe a method of implant size prediction in direct-to-implant breast reconstruction patients. 2. Listeners will be able to describe the relationship between pre-operative breast mound weight, mastectomy weight, and final implant size.

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The first Canadian general surgery consensus on BIA-ALCL: Impact on Plastic Surgery and future direction

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PURPOSE: Breast-implant associated anaplastic large cell lymphoma (BIA-ALCL) awareness has increased, resulting in concerns regarding the safety of implant-based reconstruction. Breast cancer patients are first seen by surgical oncologists and are therefore potentially the first health-care professionals to encounter concerns regarding BIA-ALCL. We therefore surveyed surgical oncologists on their understanding of BIA-ALCL to better assess potential effects on plastic surgery practice.
METHODS: An anonymous web-based survey was sent to members of the Canadian society of surgical oncology. The results were pooled and stratified according to case-load volume (>50% vs <50%) via the chi-square test.
RESULTS: Forty-two members responded and all participants were aware of BIA-ALCL. All participants reported that BIA-ALCL has not deterred them from referring patients for implant-based reconstruction. Twenty-two respondents (52%) discuss BIA-ALCL with their patients and 21 % (n=9) believe that BIA-ALCL typically follows a metastatic course. Eight respondents (19%) reported having a poor understanding of BIA-ALCL while 14% (n=6) were unable to identify the link to textured implants. There
were no statistical differences according to case-load volume. **CONCLUSION:** Despite the majority of Canadian breast general surgeons discussing BIA-ALCL with their patients, there is a knowledge gap in terms of the epidemiology and clinical-pathological course of BIA-ALCL. It is of outmost importance to ensure that the plastic surgery community aims at
including general surgery colleagues in educational platforms regarding BIA-ALCL to ensure collaboration and unity in an effort to offer the most accurate information to patients, and prevent misinformation that may deter patients from seeking implant-based reconstruction.
LEARNING OBJECTIVES: 1. Participant will be able to identify common epidemiological factors of BIA-ALCL. 2. Participants will be able to identify key points to discuss with patients regarding BIA-ALCL. 3. Participant will understand the multidisciplinary nature of BIA-ALCL.

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Outcomes of immediate alloplastic breast reconstruction in patients receiving post-mastectomy radiotherapy

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PURPOSE: Immediate alloplastic breast reconstruction is typically avoided in patients who require post-mastectomy radiation therapy (PMRT). However, a subset of patients undergoing alloplastic reconstruction may unpredictably require adjuvant radiation. The purpose of this study was to compare outcomes and complications in patients at our institution who have undergone immediate alloplastic breast reconstruction and received PMRT to either a permanent implant or tissue expander.
METHODS: A retrospective cohort study was performed looking at patients who underwent immediate alloplastic breast reconstruction over a 10-year period (2009 to 2019) at our regional breast centre. All patients who underwent immediate alloplastic breast reconstruction and received PMRT were included in the study. Major (wound dehiscence with device exposure, or reconstructive failure) and minor (infection, capsular contracture, revision surgery) complication rates between those patients receiving radiation to a tissue expander versus implant were compared using Fisher's exact test ($p<0.05$). **RESULTS:** Six-hundred ninety-two patients were identified, and 45 patients met inclusion criteria. Of this group, 29 received PMRT to implants and 15 received PMRT to tissue expanders. Complication rates were similar between groups for infection (6.9% vs.
14.3%), capsular contracture (41.4% vs. 21.4%), revision surgery (41.4% vs. 53.3%), wound dehiscence with device exposure (3.4% vs. 14.3%), and reconstructive failure (10.3% vs. 6.7%). Total complication rates were similar between groups (51.7% vs. 40%). **CONCLUSIONS**: Overall 6.5% of patients who underwent immediate alloplastic breast reconstruction required PMRT over a ten-year period. Complication rates for infection, capsular contracture, revision surgery, wound dehiscence, and reconstructive failure were similar between groups. Total complication rates were similar between groups. This information will help to inform patients during decision-making regarding immediate alloplastic reconstruction and expected complications when PMRT is needed.
LEARNING OBJECTIVES: 1. To understand how complication rates differ in patients who received PMRT to permanent implants vs. tissue expanders to guide patient counselling

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A prospective review of postoperative prophylactic antibiotic use in breast reduction mammoplasty: are they actually necessary?

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PURPOSE: Breast reduction mammoplasty (BRM) is a common procedure performed by plastic surgeons treating patients with hypermastia. Postoperative prophylactic antibiotics are usually prescribed in addition to

preoperative prophylactic antibiotics following this procedure, despite the lack of evidence of their effectiveness in preventing surgical site infections (SSIs). This study's purpose is to determine if the addition of prophylactic postoperative antibiotics is more effective in preventing SSIs in comparison to preoperative prophylactic antibiotics alone in BRM. **METHODS:** A prospective analysis of 124 elective BRM cases by a single senior plastic surgeon was completed. Two study groups of 62 patients were formed based on location of surgery at one of two surgical centers and each group followed one of two antibiotic regimens. The first regimen consisted of a single preoperative intravenous dose of antibiotics (group 1), while the second regimen consisted of a preoperative intravenous dose followed by a 5-day course of oral antibiotics (group 2). Primary outcome was incidence of SSIs. Secondary outcome measures included incidence of complications such as delayed wound healing and dehiscence, cellulitis, and antibiotic-related complications. **RESULTS:** Overall surgical site infection rate was 5.6%. Infection rate in group 1 was 8.1% in comparison to 3.2% for group 2 (p value 0.44). Overall incidence of complications was 29.0%; 38.7% in group 1 and 19.4% in group 2 (p value 0.03). Complications consisted of 35 cases of delayed wound healing, 7 SSIs, 2 cases of cellulitis, and 2 hematomas requiring evacuation. **CONCLUSION:** Study results demonstrated that the use of post-operative prophylactic antibiotics for BRM had no significant effect on rate of SSIs. **LEARNING OBJECTIVES:** 1. Participants will be able to question the use of prophylactic post-operative antibiotics in breast reduction mammoplasty. 2. Participants will learn about the risks and benefits of prophylactic
antibiotic use.

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Pain medication prescribing patterns in augmentation mammoplasty

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PURPOSE: Greater scrutiny and concern toward opioid use and abuse has caused a push toward more regulation on opioid prescriptions. Standard amounts of post-operative opioid prescriptions have not been explored in the literature. This study aims to objectively obtain data to quantify the amount of opioid medication required to adequately control pain for patients undergoing bilateral breast Augmentation (BBA) for both submuscular and subglandular procedures. **METHODS:** Cross-sectional Prospective data, using purposeful sampling was obtained through a take home patient pain tracking questionnaire. 56 patients were instructed to fill out a numeric analog scale (scale 0-10) to rate their overall pain on the day, and track the type and amount of pain medication they took for seven days. **RESULTS:** Both groups had adequate and comparable self-reported pain control rated 3.1/10 on average throughout the seven-day post-operative period. Within the subglandular group, the average person required 19.1 +/- 1.3 Tylenol #3 tablets per person (42.9 morphine equivalents), 17.0 +/- 2.3 Tramacet tablets (63.75 morphine equivalents), and/or 26.2 +/- 0.9 NSAIDS tablets per person over the first seven days post op. The subpectoral group average tabs per person were 25.9 +/- 1.5 Tylenol #3's (58.2 morphine equivalents), or 23.4 +/- 0.6 Tramacets (88.1 morphine equivalents), and/or 23.2 +/- 0.3 NSAIDS. **CONCLUSION:** We propose a reference range of pain medication required on average for patients undergoing BBA to obtain adequate pain control in the initial postoperative period. Authors found pain can be controlled on less than 50 morphine equivalents per day, as per the most recent Canadian guidelines. **LEARNING OBJECTIVES:** 1.To gain objective data quantifying opioid medication prescribed for patients undergoing routine bilateral breast augmentation and the amount of opioid medication required to adequately control pain. 2. To characterize a reference range to guide plastic surgeons in regard to narcotic prescribing.

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A prospective study of dynamic preoperative and postoperative anthropometric breast measurements in augmentation mammaplasty

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PURPOSE: Breast augmentation remains one of the most common aesthetic surgeries in North America. The inherent challenge in augmentation mammaplasty is to accurately determine the tissue characteristics and laxity of the breast skin envelope. A thorough understanding of tissue factors is critical to a successful operation. The purpose of this study was to provide a clinical tool for preoperative assessment based on changes in upright and supine breast measurements to improve decision-making in primary breast augmentation. **METHODS:** A prospective cohort study of consecutive patients undergoing primary breast augmentation was undertaken. Linear measurements were recorded with the patient upright. Measurements were repeated by the same surgeon with the patient supine. Measurements recorded included: sternal notch to nipple (SN), nipple to inframammary fold (IMF), internipple distance (IND), and base width (BW). Postoperative measurements were completed at the one-week, four-week and three-month time points. **RESULTS:** Seventy-four patients underwent bilateral subpectoral breast augmentation with preoperative and postoperative measurements recorded. The mean age and BMI of participants was 34.9±5.2 years and 21.8±3.6 kg/m2, respectively. Mean implant volume and projection were 351.7±87cc and 4.9±0.7mm, respectively. Preoperatively, the mean SN distance decreased by 16.2±8.1mm when supine, while mean IND increased by 19.3±11.4mm ($p<0.0001$). Postoperatively, the mean difference in SN and IND was 8.8±8.3mm and 14.8±12mm ($p<0.0001$), respectively. IMF distance increased by a mean of 16±0.7mm postoperatively ($p<0.0001$). **CONCLUSIONS:** Dynamic measurements are a simple, accurate means of objectively assessing breast characteristics, including tissue laxity and chest asymmetry.
Upright/supine SN and IND are clinically and statistically significant measurements that can guide selection of implants to fit the patient's specific tissue requirements. **LEARNING OBJECTIVES:** Participants will be able to appreciate the difference in upright/supine breast measurements as a clinical tool in preoperative patient

evaluation and assessment of postoperative results in augmentation mammaplasty.

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Surgical ergonomics and baseline characteristics among surgery staff and trainees: A pilot study
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PURPOSE: Work-related musculoskeletal disorders are present at alarming rates among surgeons. Plastic surgeons are particularly at risk for these, especially during long microscope cases or when using loupe magnification. This pilot study seeks to establishes present baseline characteristics and perspectives among plastic surgery trainees and staff. It is part of a larger project with overarching goals of identifying and reducing the surgical trainees' risks for the development of work-related musculoskeletal disorders. **METHODS**: A survey was sent to all plastic surgery attending surgeons in the lower mainland Vancouver area as well as all the plastic surgery residents nation- wide. The survey, which features elements adapted the Duke Ergonomics course, includes demographic, practice type, knowledge and behavioural questions. Descriptive statistics were used. **RESULTS**: Response rate was 38/120 (25.5%) from national plastic surgery residents and 27/80 (33.8%) from plastic surgery staff, half of them with over 10 years experience. Sitting positioning (34.6% vs. 40.5%), protective lead gown usage (27.5% vs 13.1%), loupes (97.3% vs. 92.5%), and microscope (5.0 vs 5.6%) were similar among residents and staff, respectively. Despite a high rate of MSK issues already present even in the younger trainee group (86.8%), vs. staff (92.3%), the majority show reluctance to report surgery-related MSK injuries to a work safety board (76.3% vs. 80.8%). Knowledge and formal training of ergonomics was generally poor. **CONCLUSIONS**: This pilot elucidates characteristics and perspectives of trainees and staff on surgical ergonomics, confirming our hypothesis that MSK injuries are prevalent and that there is a lack of formal training and knowledge. It sets the stage for our future directions, as interest exists for formal teaching, as well the use of wearable haptic-feedback devices measuring postures in real time. **LEARNING OBJECTIVES**: To establish preliminary data on baseline characteristics and perspectives of plastic surgery trainees and staff about surgical ergonomics.

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What does it take to be an academic Plastic Surgeon in Canada: Hiring trends over the last 50 years
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PURPOSE: Canadian academic plastic surgery positions have become highly competitive secondary to delayed retirement, stagnant hospital funding, and an increasing number of plastic surgery graduates. Little information is available to help graduates navigate this challenging landscape. Our objectives were to evaluate the training backgrounds of all academic plastic surgeons in Canada, and to develop training recommendations for residents pursuing an academic career. **METHODS**: Training backgrounds were obtained from institutions' websites. Surgeons were subsequently emailed to confirm this information and fill in missing details. Multivariable regression models were designed to analyze the effects of gender and FRCSC year on number of fellowships and graduate degrees and time to first academic position. **RESULTS**: Training information was obtained for 196 surgeons (22% female), with a 52% email response rate. 91% of surgeons completed residency in Canada. 94% completed fellowship training, while 43% held a graduate degree. 67% were hired in the same city as their residency and 18% in the same city as their fellowship. Regression analysis revealed that women took significantly longer from graduation to first academic job ($p<0.01$), with no gender differences in graduate or fellowship training. Additionally, younger surgeons were more likely to have graduate degrees ($p<0.01$). **CONCLUSIONS**: Nearly all plastic surgeons completed additional training, and most were employed where they previously trained. Women are disadvantaged, taking significantly longer to acquire academic positions, with no gender difference in fellowship or graduate training. Trainees should consider these patterns when planning their careers. Future research should focus on exploring gender-based discrepancies in hiring practices. **LEARNING OBJECTIVES**: 1) Summarize the training backgrounds of academic plastic surgeons in Canada, 2) Highlight gender disparities in hiring trends, 3) Develop recommendations for residents pursuing an academic career.

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Advanced-stage chest wall sarcoma resection and microsurgical reconstruction: Indications, outcomes, and survival based on a 12-year experience
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PURPOSE: High-grade, locally-advanced, with or without systemic metastases, primary chest wall sarcomas (AJCC III-IV) are rare neoplasms frequently associated with poor survival. The oncologic benefit of such radical surgical approach in this complex patient population remains to be defined. The objective of this study is to evaluate our clinical experience of chest wall resection and microvascular reconstruction. **METHODS**: A retrospective analysis of a prospectively-maintained database from 2007-2019 identified 19 patients with high-grade, advanced-stage chest wall sarcomas treated with radical resection and reconstruction. Patient demographics, tumor and surgical characteristics, length of stay (LOS), and perioperative complications were analyzed. Overall survival was calculated by Kaplan-Meier curve. **RESULTS**: Patient population included 9 females, 10 males with a mean age of 61.6±4.8 years. Resection indications included palliative (n=10), and curative intent (n=9). The mean tumor diameter was 14±2.2cm. All cases required microvascular reconstruction with Composix Gore-tex/Prolene mesh (n=12) used for stabilization. Flap type included: single DIEP (n=10), bilateral DIEP (n=4), single ALT+TFL (n=1), bilateral ALT (n=1), bilateral ALT+TFL (n=1), and

supercharged latissimus/serratus (n=2). There were no perioperative mortalities or flap losses. Complications occurred in 9 cases (Clavien-Dindo classification grade I, n=3, grade II, n= 3, grade IIIa, n=3). Median LOS was 15 days. Mean follow-up time was 30.1±1.4 months. Mean overall survival time of 34.6±8.5 months (stage III-57.8±17.2 months; stage IV-18.1±4.6 months, $p<0.001$). **CONCLUSION**: Microvascular reconstruction of radical composite chest wall resection for advanced-stage sarcomas can be associated with a high flap success rate and acceptable complication rate. Limited LOS and significant length of survival with mortality significantly influenced by disease stage support this aggressive approach. The option for complex reconstructions remains a viable option for high-grade, advanced-stage primary sarcomas of the chest wall. **LEARNING OBJECTIVES**: Participants will be able to learn about our experience with advanced-stage chest wall sarcoma reconstruction.

37 – Second Prize for a presentation on a Basic Science topic by a Resident

Local FK506 (tacrolimus) drug delivery enhances nerve regeneration through unprocessed fresh nerve allografts

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PURPOSE: Despite good outcomes, fresh nerve allografts are rarely used clinically due to the need for systemic immunosuppression and associated morbidity. A local drug delivery system for FK506, an FDA-approved immunosuppressant, can provide sustained release of FK506 at the site of implantation without systemic effects. The study objective was to investigate the effects of local FK506 delivery to enhance nerve regeneration in a rodent model of nerve gap reconstruction using fresh nerve allografts. **METHOD:** In male Lewis rats, a hindlimb common peroneal (CP) nerve gap (10 mm) was reconstructed with 20 mm nerve isografts from donor Lewis rats or fresh nerve allografts from genetically mismatched donor ACI rats. Rats with allografts received either systemic FK506, local FK506, or no treatment. After 4 weeks, nerve regeneration was evaluated using: (1) retrograde labeling to enumerate regeneration of motor and sensory neurons; (2) quantitative histomorphometry of the CP nerve (midgraft and distal); and (3) serum cytokine profile. **RESULTS:** Rats with isografts or fresh allografts treated with systemic FK506 demonstrated significantly greater nerve regeneration compared to untreated fresh allografts ($p<0.001$). Allografts treated with local FK506 demonstrated robust regeneration of myelinated axons from motor and sensory neurons, which was significantly better than untreated allografts ($p<0.001$) and no different than nerve isografts or allografts treated with systemic FK506 ($p>0.05$). Serum concentrations of the pro-inflammatory cytokine IL-12 were significantly lower in rats treated with both local FK506 and systemic FK506 ($p<0.05$); however, rats treated with local FK506 had undetectable serum levels of FK506 unlike rats treated with systemic FK506. **CONCLUSION:** A local FK506 drug delivery system enhances nerve regeneration through fresh nerve allografts comparable to nerve isografts or allografts with systemic immunosuppression. Local FK506 does not result in systemic FK506 toxicity. In the future, local FK506 delivery may enable clinical nerve allotransplantation without systemic FK506 toxicity. **LEARNING OBJECTIVES**: 1. State challenges of nerve gap reconstruction. 2. Describe FK506's neuro-regenerative properties

38 – First Prize for a presentation on a Basic Science topic by a Resident

Conditioning electrical stimulation improves functional recovery in a tibial to fibular nerve transfer

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PURPOSE: Treatment of foot-drop using a distal nerve transfer (DNT) is often unsuccessful, with UNPREDICTABLE outcomes. We hypothesize conditioning electrical stimulation (CES) to the donor nerve prior to DNT will improve outcomes. It is imperative that CES does not injure the donor nerve to be clinically feasible; therefore, we investigated the effects of CES on the nerve. **METHODS**: One week following a common fibular nerve injury, half of the rats were treated with tibial nerve CES. Seven days later, a tibial nerve branch was coapted to the distal fibular nerve. Length of axonal regeneration of the tibial nerve into the fibular stump was quantified at two- weeks, and tibialis anterior muscle reinnervation assessed at 10 weeks. Gait kinetics and kinematics were assessed between 7-10 weeks. The effects of CES on the nerve were compared to naïve (negative-control) and crushed (positive-control) nerves. Immunohistochemistry at 7 days assessed Wallerian degeneration and infiltration of inflammatory cells. **RESULTS**: Animals treated with CES prior to DNT had longer axon extension ($p<0.001$). Nerve conduction studies identified greater compound muscle action potentials, increased tibialis anterior muscle mass and more reinnervated neuromuscular junctions ($p<0.001$). Gait analysis of CES- treated animals identified significant improvements in gait kinetics/kinematics (velocity, vertical peak, duty factor, braking/propulsion forces, dorsiflexion, dexterity) ($p<0.05$). The tibial nerve distal to the site of CES had no macrophage infiltration nor did it demonstrate Wallerian degeneration. Plantarflexion of the treated limb was similarly preserved in both CES-treated and no-ES nerves. **CONCLUSIONS**: CES to the tibial nerve improved regeneration through a lower-limb DNT, with enhanced motor reinnervation and greater functional recovery. CES is non-injurious and safe for clinical use. CES may significantly improve outcomes for patients undergoing lower limb DNT. **LEARNING OBJECTIVES:** 1) CES improves regeneration through a DNT, 2) CES improves functional outcomes, 3) CES is a clinically feasible intervention.

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Comparing digital replantation versus revision amputation patient reported Outcomes for traumatic digital amputations of the hand: A systematic review and meta-analysis

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PURPOSE: Adults with traumatic digital amputation (TDA) of the hand may be surgically managed with replantation or revision amputation. This study aims to determine whether replantation compared to revision amputation yields superior patient reported outcomes (PROs) and other outcomes. **METHODS**: Three databases (MEDLINE, Embase, and PubMed) were systematically searched from database inception until June 13, 2019 independently and in duplicate. Data were pooled in a random-effects meta-analysis model with subgroups based on level of injury and the digit(s) involved. The certainty of evidence was evaluated using GRADE. **RESULTS**: Of 4,350 studies identified, 12 retrospective cohort studies met inclusion criteria and compared outcomes of TDA treated with replantation (n=717; 80.2% male; mean age 40.3) versus revision amputation (n=1,046; 76.1% male; mean age 41.7). Three studies reported sufficient PRO data for meta-analysis using the Michigan Hand Questionnaire (MHQ) and Disability of Arm, Shoulder and Hand (DASH) tool. Replantation of the thumb had a superior MHQ score (+12.01, 95% CI [7.96 to 16.07], I2=18%) compared to revision amputation, whether the injury was proximal or distal to the IP joint. Replantation of single non-thumb digits had a superior MHQ score (+5.32, 95% CI [3.11 to 7.53], I2=62.4%) and DASH score (-3.63, 95% CI [-7.14 to 0], I2=0%) compared to revision amputation. **CONCLUSION**: There is low-quality evidence that replantation of the thumb achieves superior PROs compared to revision amputation that may be clinically meaningful to patients based on existing estimates of the minimally important difference (MID). Although replantation also demonstrated superior PROs for single non-thumb digits, the magnitude of effect is likely not clinically important and is based on very low-quality evidence. **LEARNING OBJECTIVES**: 1. Understand how optimal treatment approach varies based on mechanism, level and type of TDA injury. 2. Appreciate how the MID of PRO tools influences whether outcomes are clinically important.

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Early mandibular distraction decreases social distance and improves psychosocial acceptance and utility outcomes in craniofacial microsomia

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PURPOSE: The utility and timing of mandibular distraction osteogenesis (MDO) in patients with craniofacial microsomia (CFM) continues to be a topic of debate, especially in the population of patients with mild or non-significant functional issues. The objective of this study was to quantitatively assess the burden of mandibular asymmetry in CFM and to accurately evaluate the outcomes of early MDO and its impact on patients' perceived quality of life (QoL) and social acceptance. **METHODS**: A validated crowdsourcing platform was utilized to recruit participants. Psychosocial acceptance and utility outcomes were assessed for patients with CFM. Participants were presented with health-state scenarios supplemented with pre- and post-operative images. Student's t- tests were utilized for statistical analysis, and significance was set at $p < 0.01$. **RESULTS**: 463 participants were included in the study. The mean visual analog scale (VAS) score for untreated mandibular hypoplasia in CFM was 0.48 ± 0.24, which improved significantly (p-value: <0.0001) to 0.63 ± 0.20 following early MDO. Time-trade off (TTO) scores for an imaginary surgery leading to perfect health with no complications were not statistically different from undergoing early MDO (p-value: 0.113). In measuring psychosocial acceptance and social distance, participants were more significantly accepting of the post-distraction state. Early mandibular distraction decreased social distance in all eight social situations assessed. **CONCLUSIONS**: Early mandibular distraction may lead to tangible positive gains in CFM patients based on utility outcome scores, psychosocial acceptance, and social distance. Therefore, although further surgery may be needed at skeletal maturity, early MDO can improve the psychological well-being of CFM patients during their crucial developmental years. **LEARNING OBJECTIVES**: 1. The participant will be able to understand the role of early MDO in CFM in the absence of functional deficits. 2. The participant will be able to appreciate the effects of early MDO on CFM patients' QoL.

42

Trapeziectomy is the recommended surgical treatment for trapeziometacarpal osteoarthritis: Results of a systematic review and network meta-analysis

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PURPOSE: Trapeziometacarpal osteoarthritis is a degenerative joint disease associated with progressive pain, joint instability, and loss of hand function. While many surgical options are available, previous meta-analyses have drawn uncertain conclusions on the relative effectiveness of different interventions. As traditional meta-analyses are limited to single pairwise comparisons, we performed a Bayesian network meta-analysis (NMA) of randomized controlled trials (RCTs) comparing surgical treatments for trapeziometacarpal osteoarthritis. **METHODS:** We searched MEDLINE, EMBASE, CENTRAL, WHO ICTRP, and ClinicalTrials.gov up to February 2019 for RCTs that examined the efficacy of surgical treatments on pain, function, and complications. Data on study characteristics, methods, outcomes, and risk of bias were abstracted by two reviewers. The GRADE approach was used to determine the certainty of evidence. **RESULTS:** A total of 12 RCTs (819 patients) comparing 7 different surgical treatments with a minimum follow-up period of 1 year fulfilled the inclusion criteria. Compared to previous published results with low certainty evidence, there is now moderate

certainty evidence that the minor differences between trapeziectomy with and without LRTI for pain (VAS +0.07; 95%CI -5.88, 6.01) or function (DASH -1.1; 95%CI -8.78, 6.81) does not meet
the minimally important difference (MID). The remaining comparisons for pain and function had low certainty evidence with significant imprecision in effect estimates. There is low certainty evidence that trapeziectomy is associated with lower complication risk compared to trapeziectomy with LRTI (OR 0.28; 95%CI 0.06-0.8) and was ranked as the treatment with the lowest complication risk by SUCRA analysis. **CONCLUSIONS:** This NMA allowed for a comparison between 7 surgical options for trapeziometacarpal osteoarthritis. It provides more definitive evidence that patients do not find a difference in pain or function between trapeziectomy with or without LRTI. Since trapeziectomy has the lowest complication profile we recommend this to be the treatment of choice. **LEARNING OBJECTIVES:** 1. Participants will be able to define a network meta-analysis and will understand when performing one is appropriate. 2. Participants will be able to describe the advantages of a network
meta-analysis over a traditional meta-analysis. 3. Participants will understand the current evidence for surgical
management of trapeziometacarpal osteoarthritis.

43 – Second Prize for a presentation on a Clinical topic by a Resident

Outcomes of AIN end to side transfer for severe ulnar nerve injury: A Western Canadian multicentre cohort study

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PURPOSE: Severe cases of high ulnar nerve injury including cubital tunnel syndrome often have poor outcomes even after surgical decompression. The anterior interosseous end to side (ETS) nerve transfer has been proposed as a novel technique to improve outcomes. The purpose of this study was to evaluate patients in Western Canada who received the AIN ETS transfer.
METHODS: Patients treated with an AIN ETS transfer were recruited from multiple sites throughout Western Canada. All patients enrolled were evaluated using an electrophysiology protocol to determine the relative contributions of AIN and ulnar nerve to reinnervate the intrinsic hand muscles. Hand function including strength and sensation was also tested. The ETS patients were compared to patients that received an end to end (ETE) AIN nerve transfer and decompression alone. All patients had a minimum of 1year follow-up. Descriptive statistics and ANOVA was used to analyze the data. **RESULTS:** Forty-three patients (AIN ETS n=21; Decompression n=12; AIN ETE n=10) from four centres in Western Canada were enrolled. There was no electrophysiologic evidence of axonal growth from the AIN to the hypothenar muscles in any of the AIN ETS patients, while significant axonal growth from the AIN was found in the ETE patients. CMAP significantly improved in the ETE group (p=0.004), while there was no difference in CMAP between the decompression and ETS group. **CONCLUSIONS:** There was no electrophysiologic evidence of axons crossing from the AIN to hypothenars following an end to side transfer. Electrophysiologic improvement was significantly improved in the ETE group. **LEARNING OBJECTIVES:** 1. Describe the relative contributions of the AIN and ulnar nerve after AIN ETS nerve transfer 2. Describe the outcomes of nerve transfers for severe high ulnar nerve injury

44 – First Prize for a presentation on a Innovation topic by a Resident

Deep learning for automated assessment of upper extremity radiographs

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PURPOSE: Hand X-rays are commonly ordered in outpatient, inpatient, and emergency settings, the results of which are often initially interpreted by non-radiology trained healthcare providers. Much like the advent of automated ECG interpretation in the 1970s, there may be utility in automating aspects of upper extremity X-ray analysis to aid with rapid initial analysis and reduce false negative interpretations. Deep neural networks have been shown to be effective in several medical imaging analysis applications. The purpose of this work was to apply a deep learning framework to automatically classify the radiographic positioning of hand X-rays.
METHODOLOGY: A 152-layer deep residual neural network was trained using the MURA (musculoskeletal radiographs) dataset from Stanford University. This dataset contains 5,933 hand X-rays. The original dataset was filtered to remove pediatric X-rays as well as bilateral and atypical views. The X-rays were all labeled as either PA, lateral, or oblique view. A subset of 851 images was set aside for model validation and testing. Dataset augmentation was performed, including horizontal and vertical flips, rotations (+/-45 degrees), as well as modifications in contrast (+2, -0.5) and brightness (+50, -50).The model was evaluated and performance was reported as a confusion matrix from which accuracy, precision, sensitivity and specificity were calculated.
RESULTS: The augmented training dataset consisted of 80,672 images. Their distribution was 38% PA, 35% Lateral, and 27% Oblique positions. When evaluated on the test dataset, the model performed with 95.5% accuracy, 92.6% precision, 94.0% sensitivity, and 96.3% specificity.
CONCLUSIONS: Radiographic positioning of hand X-rays can be effectively classified by a deep neural network. Further work will be performed on classification and localization of abnormalities, automated assessment of standard radiographic measures and eventually on computer-aided diagnosis and management guidance of skeletal pathology. **LEARNING OBJECTIVES:** 1. Understand how a computer algorithm can assist in analyzing hand X-rays 2. Appreciate the workflow required to achieve AI-assisted diagnosis and management for hand pathology identified on X-ray

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Utilities of surgery versus splinting for carpal tunnel syndrome: A longitudinal prospective cohort study
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PURPOSE: Utility is a quantitative method of expressing patient preferences for health outcomes, on a scale of 0 (death) to 1 (perfect health). This longitudinal prospective cohort study aimed to compare the change in utilities of carpal tunnel syndrome (CTS) patients following surgery or splinting. **METHOD:** We recruited adults referred to a tertiary care centre whose diagnosis of CTS was confirmed on the Katz Hand Diagram. Patient symptoms were assessed using the Boston CTS Scale. Short Form Sixth Dimension (SF- 6D), Chained Standard Gamble (CSG), Visual Analogue Scale (VAS), and EuroQol 5D Questionnaire (EQ-5D) were used to measure utilities. Patients were assessed both at baseline and after surgical release or three months of night splinting. **RESULTS:** Twenty-four patients met inclusion/exclusion criteria, of which 13 (54%) had splinting and 11 (46%) underwent surgery. Following treatment, utilities for the surgical group increased by 0.01 for SF-6D (Cohen's d=0.09), 0.03 for CSG (Cohen's d=0.31), 0.12 for VAS (Cohen's d=0.631), and 0.01 for EQ- 5D (Cohen's d=0.09). However, utilities for the conservative group decreased by 0.03 for SF-6D (Cohen's d=-0.33), 0.02 for CSG (Cohen's d=-0.25), 0.10 for VAS (Cohen's d=-0.46), and 0.05 for EQ-5D (Cohen's d=-0.33). Changes in utilities were found to significantly correlate with changes in the Boston CTS Scale for SF-6D (p=0.02), VAS (p<0.01), and EQ-5D (p<0.01) only. **CONCLUSIONS:** Utility in this CTS population increased between 0.01 and 0.12 for the surgical group but decreased between 0.02 and 0.10 for the splinting group. While SF-6D, VAS, and EQ-5D responds to changes in patients' CTS symptom and functional severity, CSG did not.
LEARNING OBJECTIVES: 1. Participants will be able to define health utility. 2. Participants will be able to appreciate the value of utility measurements in healthcare. 3. Participants will be able to describe four utility measurement methods.

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A comparative cost analysis of local anesthesia versus brachial plexus block for complex hand surgery
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PURPOSE: Local anesthesia has shown to be safe and cost-effective for elective hand surgery procedures performed outside of the operating room. The economic benefits of local anesthesia compared to regional anesthesia for complex hand surgeries performed in the operating room involving repair of tendons, nerves, or bones are unclear. The aim of this study was to perform a comparative cost analysis of complex hand surgery performed in the main operating room using local anesthesia (LA) or brachial plexus (BP) block.
METHODS: A cross-sectional study was performed on data from a prospective randomized controlled trial of anesthesia modality for complex hand surgery at our institution in Montreal, Canada. The first 40 consecutive patients randomized 50:50 to LA or BP were included. The primary objective was to determine the mean anesthesia-related cost, which was derived from the sum of anesthesia personnel fee, block room fee, and equipment/medication fee. Secondary objectives were to analyze block performance time, block onset time, duration of anesthesia, duration of surgery, and time in the recovery room.
RESULTS: The mean anesthesia-related cost of performing hand surgery under LA was $241±33 (mean±SD), compared to $429±43 for BP, a difference of $188±12 per case (p<0.0001). The mean block performance time was significantly quicker for the LA (78±31 sec) versus BP (456±403 sec) patients (p<0.001). We found no difference in the total duration of surgery, duration of anesthesia, block onset time, and time in the recovery room (p>0.05). **CONCLUSIONS**: The use of LA for complex hand surgeries performed in the operating room is associated with mean cost savings of $188 per case. This has significant economic implications for a publicly funded health care system. **LEARNING OBJECTIVES**: To understand the effects of LA or BP for complex hand surgery on OR efficiency and costs to public health care.

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A prospective analysis of opioid prescription, consumption, and psychometric correlations in outpatient plastic surgery procedures.
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PURPOSE: The primary purpose is to determine the factors predicting opioid prescription, and the secondary purpose is to determine the factors predicting opioid tablet consumption after outpatient Plastic Surgery procedures.
METHODS: Data was collected prospectively using two surveys: (1) pre-operative on the day of surgery, and (2) post-operative on approximately day 14. The primary outcome was type of prescription given (opioid versus non-opioid). The secondary outcome was the number of opioid tablets consumed at the second survey. Information on demographics, the pain catastrophizing scale (PCS) and patient health questionnaire-4 (PHQ-4) for depression and anxiety were gathered. Statistics included Chi-Square, student's t-test, univariable, and multivariate regression analyses. **RESULTS:** Four hundred and forty patients were recruited, of which 49% (214) received an opioid prescription. The following factors were independently associated with receiving an opioid prescription: upper limb surgery (OR 4.0 [1.7-9.3]), breast and abdomen (OR 11.1 [1.2-101.1]), dermatologic (OR 0.2 [0.1-0.5]), and surgery in the main operating room (OR 23.6 [10.0-55.2]). Patients consumed a mean of 8 opioid tablets post-operatively. More tablets were consumed if patients were younger than 60 years old (p<0.05), taking pain medications pre-operatively (p=0.03), and if they scored higher on the PHQ-4 (p=0.002) but not the PCS (p=0.732). Surgeons prescribed less opioids over time in minor procedures (p<0.001), without an increase in pain crises.
CONCLUSION: The patterns of opioid prescription and

consumption after outpatient Plastic Surgery are elucidated. Plastic surgeons globally over-estimate patients' opioid requirements. Potentially less opioids could be prescribed in the minor procedure room without an increase in pain crises. **LEARNING OBJECTIVES:** (1) Recognize the factors associated with prescribing opioids. (2) Identify patients at risk of increased opioid tablet consumption. (3) Familiarize oneself with the mean number of tablets consumed for common outpatient procedures.

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Opioid medication disposal among patients following hand surgery
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PURPOSE: Despite efforts at increasing public awareness to dispose unused narcotics, prescribed narcotics are retained post-operatively, which may lead to drug diversion and abuse. This study assessed retention of unused opioids among hand surgery patients and describes disposal methods and barriers. **METHODS**: Participants undergoing hand surgery were given an opioid disposal information sheet pre-operatively (n = 103), and surveyed post- operatively to assess unused opioids retained, disposal methods, and barriers to disposal. A binomial logistic regression was conducted to determine if age, gender, visual analog pain score, and/or type of procedure could predict opioid disposal. **RESULTS**: Eighty-eight patients were included in the analysis (15 were excluded; finished prescription or continued opioid use for pain control). Unused opioids were retained by 70 patients (79.5%) and disposal was reported by 18 patients (20.5%). Common disposal methods included returning opioids to a pharmacy (61.1%) or mixing them with an unwanted substance (16.7%). Reasons for retention included potential future use (61.4%), inconvenient disposal methods (22.9%), or keeping an unfilled prescription (11.4%). Patients undergoing soft tissue only procedures were more likely to dispose unused opioids compared to those undergoing bony- related procedures (OR = 2.2, CI = 0.53 - 9.29). Females were more likely to dispose compared to males (OR = 1.1, CI = 0.38 - 3.32). Despite these observed trends, however, there were no significant predictors associated with narcotic disposal. **CONCLUSIONS**: Most patients undergoing hand surgery retain prescribed opioids for future use or due to impractical disposal methods. The most used disposal methods include returning narcotics to a pharmacy or mixing opioids with unwanted substances. Identifying predictors of disposal may provide important information when developing strategies to increase opioid disposal. **LEARNING OBJECTIVES**: 1. Describe opioid disposal methods and reasons for retention among patients undergoing hand surgery. 2. Consider patient factors that may contribute to disposal.

GENERAL POSTER

GP01 - First Prize for a Poster presented by a Medical Student

A possible immune mechanism for hypertrophic scarring after burn injury
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PURPOSE: Hypertrophic scar (HTS), a common and significant consequence of burn injury, causes reduced motion, pruritis, heat intolerance, and disfiguration. It does not respond well to current treatments. Inflammation, induced by extracellular matrix (ECM) and endogenous ligands, has been suggested to be associated with HTS. Small leucine-rich proteoglycans (SLRPs), important regulators of ECM assembly and cell signalling, are involved in wound healing. We hypothesized that endogenous molecules released from damaged burn tissue could activate the toll-like receptor (TLR) 2 and 4 inflammatory pathways. **METHODS**: Skin tissues from burn patients and healthy donors were collected at the University of Alberta Hospital. Human embryonic kidney cells expressing TLR2 and TLR4 (HEK-Blue hTLR2 or 4) were treated with minced burn tissue (n=18) and normal skin (n=5) samples, denatured SLRPs decorin and biglycan, and lipopolysaccharide (LPS) and lipoteichoic acid (LTA) as positive controls. Secreted embryonic alkaline phosphatase (SEAP) assay was used to measure NF-kB activation to indicate TLR activity. Burn and normal skin samples were quantified for LPS and LTA. **RESULTS**: Burn tissue stimulated TLR2 and TLR4 pathways more than normal tissue. Compared to normal skin, burn tissue contained significantly higher LTA levels, but not LPS. Denatured and natural decorin and biglycan stimulated the TLR4 pathway, but not the TLR2 pathway. **CONCLUSION**: The results indicate that burned tissue can stimulate toll-like receptor pathways. This would lead to production of proinflammatory cytokines which may promote fibrosis and contribute HTS formation. These studies will help in the development of future targeted therapeutics for HTS and other fibroproliferative disorders. **LEARNING OBJECTIVES:** At the end of this presentation, learners will be able to 1. Manifest concern for patients suffering from HTS. 2. Understand inflammatory interactions involved in abnormal wound healing. 3. Consider exploring future targeted therapeutics for HTS.

GP02

Shoulder outcomes after glenohumeral joint surgery in infants with brachial plexus birth injury
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PURPOSE: Brachial plexus birth injury (BPBI) occurs in 1-2/1000 births and results in lifelong upper limb impairments in 25-30% of children. It is now recognized that glenohumeral joint (GHJ) subluxation following BPBI can develop in infancy. Early surgical tendon transfer reduces the joint and corrects muscle imbalance. Studies

have yet to investigate functional outcomes after surgical management of infantile GHJ subluxation and factors related to post-operative subluxation recurrence.
METHOD: A retrospective case series of infants with BPBI who underwent GHJ surgery between January 2014 and July 2019 was conducted.
Demographic and treatment-specific (surgery type, intra-operative co-interventions) data were extracted from participants? health records. The primary functional outcome was the change in infants' pre- and post- operative Active Movement Scale (AMS) scores. Demographic data were analysed descriptively, and pre- and post-operative comparative analyses were conducted using the Wilcoxon paired test. **RESULTS:** Fifteen infants with BPBI (40% Right-sided, 80% female) underwent subscapularis slide and teres major and latissimus dorsi tendon transfers (mean age: 8.4 ± 2.0 months). Six- and 12-month post-operative AMS scores showed clinically and statistically significant improvement in shoulder abduction, flexion, external rotation and elbow flexion ($p<0.05$). The two patients experiencing recurrent subluxation within 6 months had not received the same pre-operative co-interventions as the non- recurrence group (splinting (n=5), Botulinum toxin (Botox) injection (n=1)) despite clinically worse pre-operative AMS scores. Both recurrences resolved with post-operative Botox to the internal rotators; two others also required post-operative Botox. **CONCLUSIONS:** Further data collection is required; however, preliminary results demonstrate that GHJ surgery during infancy can improve shoulder and elbow function. Additionally, post-operative Botox injection to the internal rotators appears to be an effective management strategy for recurrent subluxation. **LEARNING OBJECTIVES:** To understand the risks and outcomes of early tendon transfers in the management of infantile GHJ subluxation following BPBI.

GP03

The impact of immediate breast reconstruction on adjuvant therapy timing and disease-free survival in women following mastectomy to treat breast cancer
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BACKGROUND: Immediate breast reconstruction (IBR) is a safe surgery aiming to improve the quality-of-life for women post-mastectomy. Some literature suggests that IBR delays time to adjuvant therapy and may worsen oncologic outcomes. A comprehensive review investigating the impact of IBR is lacking. Herein we present the preliminary findings for our 5-year retrospective review. **METHODS**: Breast cancer patients at The Ottawa Hospital treated with mastectomy +/- IBR from Jan/2018 - Dec/2018 were reviewed for eligibility. Exclusion criteria included age (< 18), therapeutic mastectomy, distant site malignant disease, de novo stage 4 cancer, neoadjuvant therapy history, and delayed breast reconstruction. Patient demographic, operative, and morbidity and mortality details were recorded. Disease-free survival (DFS) was investigated using Kaplan-Meier methods. **RESULTS**: Of 481 women reviewed, 219 (46%) were eligible. 40 patients (18%) underwent IBR (implant-only [n=18, 9%]; tissue expander [n=12, 6%] and autologous-flaps [n=5, 4%]). Adjuvant chemotherapy or radiotherapy was required by 27 (12%) patients. The mean age and BMI were significantly lower among women with IBR compared to women without IBR at 49 vs. 64 years ($p < 0.001$) and 24.6 vs. 27.4 kg/m2 ($p = 0.008$), respectively. The DFS (based on follow-up post-mastectomy) was determined to be a median of 13.5 months (n=163 patients, 95% CI: 12.9, 14.0). DFS was statistically similar in women with IBR compared to those without IBR ($X2= 0.3$, $df=1$, $p= 0.6$). DSF did not differ according to the presence or absence of delay to adjuvant chemo- and/or radiotherapy ($X2 = 0.9$, $df=1$, $p= 0.3$). **CONCLUSIONS**: We reviewed over 200 patients in 2018. Our 5-year study will evaluate 1460 patients using Cox regression methods to adjust for possible confounding variables. **LEARNING OBJECTIVES:** Participants will be able to appreciate the role of IBR in post-mastectomy breast reconstruction, as well as the clinical implications of IBR on oncologic outcomes.

GP05

Hyaluronidase use among Canadian plastic surgeons treating complications related to hyaluronic acid fillers
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PURPOSE: Hyaluronic acid (HA) fillers are a common treatment to address changes in the aging face. Second to only botulinum toxin, HA is the next most common non-surgical aesthetic procedure. Side effects associated with HA fillers are usually short-lived such as ecchymosis and swelling but serious ones such as vascular occlusion must be addressed promptly. Hyaluronidases are enzymes which depolymerise and degrade HA. There are many described indications for the use of hyaluronidases in aesthetic plastic surgery. To better understand the current practice patterns, we surveyed Canadian plastic surgeons on their use of hyaluronidase to treat HA filler related complications. **METHOD**: With the approval of the Canadian Society of Plastic Surgeons, an electronic survey was distributed to all members in 2018-2019. A total of 350 surveys were distributed and 98 surveys were completed for a response rate of 28%. **RESULTS**: Approximately half of the survey respondents use HA fillers in their practice and 78.9% of injectors carried hyaluronidase. Forty-eight percent of providers who reported using HA fillers have had to use hyaluronidase several times a year to treat complications of patient that were their own (22.7%), another provider's (13.6%) or a combination (63.6%). Nearly all users of hyaluronidase have treated filler over-correction (95.5%), and asymmetry (86.4%). Less than half have experience treating vascular occlusion. The dose of hyaluronidase used to treat vascular occlusion ranged widely from 30 to 5000 units. Surgeons stocked up to 90,000 units of hyaluronidase in the office, the range varied widely. Skin testing of hyaluronidase for hypersensitivity reactions was performed by less than 10% of hyaluronidase users. **CONCLUSION**: Approximately half of all surgeons who inject HA fillers have had to use hyaluronidase to treat complications. The use of hyaluronidase to manage HA filler complications in aesthetic practice is rather diverse and heterogeneous. **LEARNING OBJECTIVES:** 1) Participant will be able to describe 3 common complications of Hyaluronic Acid

fillers. 2) Participants will be able to describe the most common uses of Hyaluronidase by plastic surgeons in Canada. 3) Participants will be able to identify at least 3 different indications for Hyaluronidase.

GP06

Assessing hands-on interventions for quality improvement of pediatric hand injuries

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PURPOSE: Hand fractures account for 15% of all fractures seen in pediatric Emergency Departments (EDs). We previously identified an opportunity for improving the initial care of hand injuries provided by ED physicians at our centre. The purpose of our study was to assess whether educational interventions would improve the success rate of closed reductions in pediatric hand injury patients. **METHOD**: We developed and implemented cross-disciplinary educational interventions for ED and pediatric physicians. The interventions consisted of a hand injury review followed by hands-on sessions involving radiograph assessment, local anesthetic administration, closed reduction, and splinting. We carried out retrospective reviews in patients <18 years of age who presented with hand fractures or dislocations and underwent a closed reduction in the ED. We assessed the efficacy of the interventions by quantifying hand injuries that required repeat reduction by a hand surgeon after initial reduction in the ED. **RESULTS**: We identified 165 patients pre-intervention to 340 patients post- intervention. We saw a significant reduction in the percentage of hand injuries requiring repeat reduction post-intervention: metacarpal shaft fractures (15.4%-10.5%), metacarpal neck fractures (5.8%-2.7%), proximal phalanx neck fractures (16.6%-5.5%), proximal phalanx base fractures (7.5%-2.1%), metacarpophalangeal dislocations (20.0%-0.0%), and proximal interphalangeal joint dislocations (3.3%-0.0%). The overall rate of repeat reductions decreased from 7.27% pre-intervention to 4.41% post- intervention. **CONCLUSIONS**: Our results indicate that a quality improvement initiative consisting of hands-on educational interventions resulted in a significant decrease in pediatric hand injury repeat reductions. This suggests a role for such interventions in the improvement of pediatric patient care and quality of life. **LEARNING OBJECTIVES**: Recognize the importance of cross-disciplinary educational interventions as practice-changing tools. Recognize the efficacy of such interventions for injury management and patient quality of life.

GP07

The decline of textured implants in single stage breast reconstruction in Alberta

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PURPOSE: The knowledge of breast implant associated anaplastic large cell lymphoma (BIA-ALCL) has grown rapidly since the first FDA communication in 2011. BIA-ALCL's association with textured implants has been identified. However, it is unclear whether practice patterns have changed in regards to the use of textured implants. The purpose of this study was to identify patterns of use of textured implants in direct to implant breast reconstruction in patients in Alberta. **METHODS**: Cancer Surgery Alberta developed a synoptic reporting template for primary breast reconstruction in 2014. The synoptic database allows for the quick reporting and storing of operative information in regards to a multitude of cancer cases. This database was queried for all primary breast reconstruction cases captured from 2014- May 2019. Data pertaining to implant type and manufacturer was collected. **RESULTS**: 222 cases involved the placement of implants in a direct to implant reconstruction. Initially 95% of implants used were textured. By 2019, no implants used were textured. The most drastic reduction began following 2015. A majority of implants used were manufactured by Allergan. **CONCLUSION**: As BIA-ALCL becomes an increasing concern, the role for textured implants remains unclear. We have shown there has been a dramatic reduction in the use of textured implants in direct to implant breast reconstruction in Alberta. We have demonstrated the value of clear, consistent, and searchable information in the era of patient directed care. **LEARNING OBJECTIVES**: 1) The learner will identify changing trends in primary breast reconstruction. 2) The learner will appreciate the role of searchable provincial databases in quality improvement and research.

GP08

Shoulder injuries and brachial plexus injuries: a prospective evaluation of outcomes

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Edmonton, AB

PURPOSE: Adult brachial plexus injuries (BPI) often result from motor vehicle accident or falls. Due to the high-energy impact, musculoskeletal structures in the shoulder girdle are liable to injury. In a recent retrospective study, we demonstrated concomitant rotator cuff disruption in ~35%, much higher than previously reported in the literature. In this prospective study, we systematically evaluated concomitant shoulder girdle injury in all referrals to a regional peripheral nerve injury clinic and the impact of early intervention on functional outcomes. **METHODS:** All patients with upper limb nerve injury referred to the Central and Northern Alberta Peripheral Nerve Injury clinic between 2017 and 2019 were screened for concomitant shoulder girdle injury. Those with a history of traumatic injury and impaired shoulder function were investigated with MRI, U/S, or x-rays. Patients were excluded if they were pediatric, had a non-traumatic etiology, chronic rotator cuff tear, confounding neurologic diagnosis and inability to consent. Primary functional outcomes were MRC and active range of motion at final follow-up. **RESULTS:** Forty-five patients were recruited for the study. Average age was 46.5 +/-18.2 years. The majority were male (67%) and most had injury to the brachial plexus (67%). Sixty-two percent of patients had a shoulder girdle injury including 31% who had full thickness rotator cuff tears. Forty-one percent of patients required operative fixation of the shoulder pathology including 15 rotator cuff repairs. This was done within 6 months of injury. MRC improved for all patients over the course of the 8 +/- 6

month follow-up ($p<0.01$). There was no statistical difference in final MRC scores and active range of motion between patients with and without skeletal shoulder girdle injury. **CONCLUSIONS:** Concomitant musculoskeletal injury to the shoulder girdle is common in patients with upper limb nerve injury. Prompt recognition and early intervention are crucial in restoring shoulder function. **LEARNING OBJECTIVES**: 1. Participants will be able to describe the prevalence of concomitant shoulder girdle injury in peripheral nerve clinics. 2. Participants will be able to describe the functional outcomes following rotator cuff repair.

GP09

Outcomes of surgery for recurrent or persistent carpal tunnel syndrome

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PURPOSE: Carpal tunnel syndrome is the most common neuropathy. Although extensively studied and treated, rates of recurrence can be anywhere between 3 and 19% post release. The purpose of this study was to identify those patients undergoing revision carpal tunnel releases in two surgeons' practices over the last 5 years and examine outcomes. Additionally, we attempted to determine whether there might be differences in demographic variables in those patients undergoing revision versus primary carpal tunnel release. **METHODS**: Operative records of two surgeons' practices at the Hand and Upper Limb Centre in London, Ontario were reviewed and all revision/extended carpal tunnel procedures were identified from 2012 to 2018. Demographic data including results of nerve conduction studies was collected. A random cohort of primary carpal tunnel patients was selected by identifying those patients undergoing the procedure directly following (or before when required) a revision carpal tunnel procedure and similar demographic data was collected. Data was then compared using t-tests and Chi square tests where appropriate. **RESULTS**: 31 revisions (28 patients) were identified. There was a similar distribution of male and female patients with most revisions occurring in the first 5 years after initial release. Only 40% of patients had improvement of their symptoms following their initial release. Nerve conduction studies were not significantly different in patients pre and post first release or between those undergoing primary release and those undergoing revision. **CONCLUSION**: Revision carpal tunnel release is not an uncommon procedure. At the Hand and Upper Limb Centre, a revision procedure subjectively improves patients' symptoms the majority of the time. Ongoing symptoms may thus often be caused by inadequate release. There does not seem to be any predictive factors for those patients requiring revision carpal tunnel procedure other than the presence of spinal neuropathy and previous history of bilateral release. **LEARNING OBJECTIVES**: 1. Learners will identify factors associated with increased risk of revision carpal tunnel procedures. 2. Learners will be aware of inadequate release in persisting symptoms post carpal tunnel release.

GP10

Volar scapholunate ligament capsulodesis

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PURPOSE: Scapholunate Ligament (SLL) injury usually begins volarly and progresses dorsally. Isolated volar SLL injuries can lead to persistent pain and disrupted carpal kinematics. We describe our experience with the volar capsulodesis technique to repair isolated volar SLL injuries. **METHODS**: We performed a retrospective chart review for all patients who underwent a volar SLL reconstruction. Demographic data and pre- and post-operative range of motion and radiographic parameters were collected, including pain on a visual analog scale (VAS). Quick Disability of Arm Shoulder Hand QuickDASH) and Patient-Related Wrist Evaluation (PRWE) questionnaires were completed. **RESULTS:** We had 33 wrists with a mean follow-up of 41.1 months. The majority of reconstructions were using the long radiolunate (91%) with or without the short radiolunate and a volar or dorsal capsulodesis. Arthroscopically, 23 (70%) of patients had a Geissler grade 3 tear and 8 (24.2%) were grade 4. Range of motion and grip strength did not differ pre- versus post-operatively. There we no changes in the pre- and post-operative radiographic parameters, including the scapholunate (SL) gap, SL angle and the radiolunate angle. Pre-operative mean VAS was 5.5, while post-operatively it was 1.0 with 20 (61%) patients reporting "no pain". Average post-operative QuickDASH and PWRE were 25.8 and 35.1, respectively. Three patients had a pin site infection, and 2 patients had recurrent diastasis. **CONCLUSION**: In isolated volar SLL tears, volar capsulodesis provides reliable patient pain relief and improvement in patient-related outcomes such as QuickDASH and PRWE. **LEARNING OBJECTIVE**: Understand the role of the volar capsulodesis technique for the reconstruction of volar scapholunate ligament injuries.

GP11

Comparing open carpal tunnel or trigger finger release procedures performed under local nesthesia with or without the use of a tourniquet

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PURPOSE: Trigger finger and carpal tunnel syndrome are two of the most common conditions treated by the hand surgeon. During these procedures, a tourniquet is often used to minimize bleeding and improve visualization of the operative field. However, it may be associated with pain and discomfort. To date, there are few prospective studies investigating the safety and outcomes of tourniquet-free minor hand procedures. **METHODS:** This was a randomized controlled trial comparing patients undergoing open carpal tunnel or trigger finger release with or without the use of a tourniquet. This was an equivalence trial in terms of operative time, bleeding scores and peri-operative complication rates. In addition, peri-operative subjective patient experience was investigated for both techniques. This was measured based on a numerical rating scale

(NRS) for pain, anxiety and overall satisfaction. **RESULTS:** A total of 67 patients were recruited. Both groups were similar with respect to distribution of age, sex, handedness and tobacco use. Median scores for operative time, anxiety and overall satisfaction were comparable between the two groups. With regard to patient discomfort, median scores were significantly higher in the tourniquet group when compared to the non-tourniquet group (3.0 vs 1.0, p-value of 0.02). Bleeding scores for the tourniquet group were significantly lower than for the non-tourniquet group (p-value < 0.05). **CONCLUSION:** This trial supports the non-inferiority of the tourniquet-free technique with respect to operative time and peri-operative complication rate. Additionally, it is associated with enhanced peri-operative patient experience due to decreased tourniquet- associated discomfort. **LEARNING OBJECTIVES:** 1) The learner will have gained insight into the safety and efficacy of the no-tourniquet technique when performing carpal tunnel or trigger finger release. 2) The learner will understand the benefits of the no-tourniquet technique, specifically with respect to the patients' peri-operative experience.

GP12

Assessing new technologies in surgery: Case example of acute primary repair of the thumb ulnar collateral ligament

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PURPOSE: Health technology assessment (HTA) provides a means for assessing the technical properties, safety, efficacy, cost-effectiveness, and ethical/legal/social impact of a novel technology. An important component of HTA is the cost-effectiveness analysis (CEA), which can be assessed using model-based CEA. This study sought to use a CEA model to compare the cost-effectiveness of a novel device in hand surgery, the InternalBrace™, with the standard technique for primary repair of complete ulnar collateral ligament (UCL) tears. **METHODS**: A model was developed for complete UCL tear requiring acute surgical repair, comparing the cost-effectiveness of standard technique primary repair and InternalBrace™ Ligament Augmentation repair from a societal perspective. Primary outcomes included quality-adjusted life years (QALYs), cost, net monetary benefit (NMB) and incremental net monetary benefit (INMB). A cost-effectiveness threshold of C$50,000/QALY was used to compare the two techniques. Sensitivity analyses (SA) were conducted to assess parameter uncertainty, specifically the impact of the InternalBrace™ cost, time off work, probability of complication and post- operative outcome. **RESULTS**: The NMB for standard technique was $42,598 and $41,818 for InternalBrace™. Standard technique was preferred for primary repair of complete UCL tears. One-way SA demonstrated that the InternalBrace™ became cost-effective if individuals return to work in <18 days (base case 23 days). The device was also favoured when the cost was <$50 and the time to return to work difference was at least 1 day. **CONCLUSIONS**: Our model demonstrates that there may be significant costs associated with the introduction of novel health technologies and that certain conditions, such as an earlier return to work, must be met in order for devices like the InternalBrace™, to be a cost-effective option. This study provides an example of how model-based CEA is a useful tool to assess the cost-effectiveness of a novel device. **LEARNING OBJECTIVES**: To educate physicians about one of the components involved in evaluating surgical devices.

GP13 - Second Prize for a Poster presented by a Medical Student

Exploring the potential of using augmented reality holograms for skills training in Plastic Surgery

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PURPOSE: Acquisition of hands-on skills and complex anatomical knowledge are core competencies in plastic surgery training that require resource intensive and limited in-person OR training time. To alleviate such limitations, we propose a new form of self-directed learning using life-like augmented reality holograms projected in physical space to mimic in-person training experiences to acquire visuo-spatial-motor skills. We explore the feasibility and effectiveness through 2 pilot studies of 1) learning hand motions from a pair of holographic hands and 2) learning anatomy from a holographic inner ear model. **METHODS**: Holographic models were created using animation software and displayed using the Microsoft Hololens. Study 1: 9 participants were recruited to learn 6 different hand motions from holographic hands, video, and in-person. Study 2: 26 2nd year medical students learned inner ear anatomy from a holographic model based off of MRI data. For both studies, the success rate of learning was recorded and feedback on effectiveness was obtained through questionnaires. Free-form comments were also collected. **RESULTS**: For learning motor skills, 9/9 of participants learned hand motions as effectively as in-person and 7/9 agreed it mimicked in-person training. For learning anatomy, 24/26 participants strongly agreed that holographic learning was effective. In collected comments, 8 participants noted that anatomic holographic learning was equivalent or better than real-life learning often citing greater access, interactivity, and engagement. **CONCLUSION**: Visuo-spatial-motor skills acquisition by holographic models may be a feasible and effective self-directed learning method comparable to in-person training experiences with potential benefits even beyond existing learning methods. Further specific applications in plastic surgery should be explored. **LEARNING OBJECTIVES**: Attendees will be introduced to the concept/potential of new augmented reality technology in skills training and initiate broader discussions on specific applications within plastic/reconstructive surgery.

GP14

Hands-on workshops improve emergency department physicians' self-reported understanding of pediatric hand injuries

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PURPOSE: Initial assessment and management of pediatric hand fractures is a critical skill for Emergency Department (ED) physicians and previous work has demonstrated that there is an opportunity to improve this care. We aimed to understand ED physician perception of hand injury treatment and to improve their understanding and confidence in treating these injuries. **METHODS**: Didactic workshops for ED physicians were developed and run by a team of plastic surgeons and ED physicians. The workshops consisted of a short review by a hand surgeon followed by hands-on sessions involving radiograph assessment, administration of local anesthetic, closed reduction, and splinting. Two sessions, 6 months apart, were provided. A brief survey before and after the workshops was administered to gather demographic information, self-assessed confidence and competence in treating hand injuries, knowledge of basic hand injury care, and finally feedback on the intervention itself. **RESULTS**: 52 physicians participated in both workshops. 32% of physicians had been in practice for more than 10 years and 40% identified as Pediatric Emergency physicians; the remaining 60% were either still in training or were Emergency or Pediatric physicians. Following the intervention, physicians viewed hand reduction as a more critical skill and their self-efficacy ratings with regards to deciding which fractures to reduce, providing local anesthetic, performing a reduction, and providing post-reduction immobilization increased. Their median scores on the knowledge-testing questions also increased post-intervention from 73.3% to 86.7%. Finally, physicians reported that they find the intervention educational, useful, and important. 89% of participants said that they intended to change their practice based on this intervention. **CONCLUSION**: The combination of didactic and hands-on teaching is an effective and well-received method of refining physician knowledge and increase confidence in treating subspecialty-specific clinical presentations. **LEARNING OBJECTIVES:** Recognize the need for and benefits of cross- disciplinary knowledge sharing.

GP16

Do intra-operative noise levels exceed workplace safety standards?

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Purpose: Excessive noise exposure impacts health, cognition, communication and hearing. Major noise contributors include various machines, instruments, conversation and music. The existing literature does not adequately describe intraoperative sound intensities in plastic surgery. The purpose was to measure intraoperative sounds levels. **Methods**: Sound intensity was recorded at surgeon ear level over a 3-month period. Data collection was performed using the National Institute for Occupational Safety and Health (NIOSH) mobile sound meter app. Sound is reported in A-weighted decibels for sound intensity (LAeq), maximum sound (Max) and C-weighted peak sound (LCpeak). Recordings were annotated with descriptors including smoke evacuator, diathermy, anesthesia machine, body-warmer, equipment movement, music, and conversation. Sound levels were compared to Canadian Centre of Occupational Health and Safety standards and World Health Organization's (WHO) hospital sound level recommendations. **Results**: Eleven cases were assessed – bilateral breast reduction (n=4), gynecomastia excision with liposuction (n=4), and Dupuytren's contracture (n=3). Baseline preoperative measurements were recorded at 48 dB. LAeq and Max sound intensity during procedures was as follows: bilateral breast reduction (61.4, 74.05 dB), gynecomastia excision with liposuction (59.93, 72.41 dB), and Dupuytren's contracture (59.93, 72.41). Performing ANOVA analysis and post hoc Tukey procedure, we find a statistically significant difference between Gynecomastia and both Breast Reduction and Dupuytren's contracture cases ($p<0.001$). Primary contributors were equipment and staff conversation. **Conclusion**: The Canadian Centre for Occupational Health and Safety nationwide criterion level for noise intensity permitted during an eight-hour shift is 85 dB(A), while WHO recommendations for hospitals is 34 dB. Sound intensity in this study greatly exceeded the WHO recommendations but did not exceed workplace safety standards. Prior studies reveal the deleterious impact of excessive OR noise on performance and communication parameters. This study provides impetus to adopt interventions targeting reduction of intrusive intraoperative noise. **LEARNING OBJECTIVES**: This study provides data on intraoperative sound intensity in and the relationship to workplace safety guidelines.

GP18

Involving Plastic Surgery residents in surgical missions: A systematic review and future directions

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BACKGROUND: Interest in international surgical missions has been rising exponentially in recent years, with the plastic surgery community being a leader in this field. The role of residents in such missions remains a topic of debate. This systematic review aims to consolidate the literature relevant to including plastic surgery residents on international surgical missions, while also clarifying the impact it may have. **METHODS:** A comprehensive search of the English literature was performed to identify articles relevant to plastic surgery resident involvement in the context of surgical missions. In accordance with the PRIMSA guidelines, PubMed, Medline and EMBASE were queried, limited to full-text articles and not including full year fellowships. **RESULTS:** Of the 274 initial articles, 22 were retained for full text review. These were grouped into three categories; surveys (n=10), reflections (n=6) and reviews (n=6). Specific data was extracted for each category and was summarized in respective tables. Concerning surveys, each had distinct conclusions, and few (n=3) included a statistical analysis. For reflection pieces, the organization, trip duration and location differed across

articles but an overall positive attitude towards missions was common. Regarding reviews, each article had a section addressing plastic surgery resident involvement in a unique manner. **CONCLUSION:** This systematic review highlights the overwhelming support from residents and staff, the highly regarded educational value and the positive social effects associated with plastic surgery resident participation in international missions. The authors hope this will encourage and facilitate the implementation of such rotations into residency programs. An algorithm summarizing the steps needing to be taken in order to participate as a resident, including the current resources available, is proposed. **LEARNING OBJECTIVES:** 1) Support the participation of plastic surgery residents in an international elective. 2) Identify resources currently available and a clear strategy regarding how to participate in an international elective as a resident.

GP19

Iloprost reduces digit amputation following severe frostbite in marginalized patients

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PURPOSE: Frostbite often leads to digital amputation. Recent literature shows that the use of iloprost and tissue plasminogen activator (tPA) may avoid amputation of frostbitten digits in healthy athletes. However, extension of these therapies to more vulnerable cohorts has been limited. We evaluated the efficacy of iloprost ± tPA in the reduction of amputation rates among a marginalized population with frostbite injuries. **METHOD**: A retrospective case series was performed including all patients who received iloprost for the treatment of frostbite in Calgary. Using paper and electronic medical records, information on patient demographics, comorbidities, frostbite injury characteristics, therapies, complications, and amputation rates were collected. The severity of frostbite injury was graded according to a modification of the Cauchy et al. (2001) grading system (grades 1-4). **RESULTS**: Eight patients were treated with iloprost in February and March 2019. Five patients received tPA simultaneously. The mean age was 36.3 ± 11.6 and most patients were male (n=7). All patients had at least three risk factors for frostbite injuries, including: psychiatric illness (n=6), homelessness (n=6), and substance abuse (n=6). One-hundred and nine digits were identified as being at risk for amputation, of which 93 digits (85%) had the most severe grade of injury (grade 4). Following treatment with iloprost ± tPA, patients with grade 3 and 4 injuries had 75% and 46% complete salvage, respectively, while those with less severe injuries recovered completely. By comparison, historical cohorts with grade 4 frostbite injuries (Cauchy et al., 2001) treated with conservative management would have anticipated 0-2% salvage. **CONCLUSIONS**: Iloprost ± tPA have shown benefit in reducing amputation rates among marginalized patients affected by severe frostbite injuries. **LEARNING OBJECTIVES**: 1. Recognize the therapeutic potential of iloprost and tPA in the treatment of frostbite.

GP20

Pharmacological adjuncts in peripheral nerve regeneration: A narrative review

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PURPOSE: Peripheral nerves (PN) are common sites of injury with significant functional implications. PN repair continues to result in poor and slow recovery, leading to a burden on the patient, healthcare system, and economy. Attempts to improve outcomes include adjuncts applied directly to repaired segments. These can be technically challenging or impractical, thus there is interest in more easily administered agents. In this paper, the authors review pharmacologic adjuncts for PN repair to identify feasible methods of improving outcomes. **METHOD**: A comprehensive literature search of publications between 1997 and 2019. Resources included Novanet, PUBMED, Google Scholar, and Ovid. Inclusion criteria included human and animal studies on oral and systemic administration of pharmacological agents in PN regeneration. Exclusion criteria focussed away from the central nervous system and direct application of agents to the nerve. **RESULTS**: 60 publications were included comprising 6 in vitro studies, 52 animal studies, and 2 human studies. Overall, studies were limited by outcome measurements, low numbers, and poor controls. Study designs varied in terms of method of nerve injury, and the presence or absence of a repair, limiting our ability to compare results. **CONCLUSIONS**: While use of agents directly on PN segments thrives in the literature, studies on pharmacological adjuncts are lacking. Some agents have shown promise, but a lack of follow up or human-based studies makes it difficult to see the merit in clinical application. Despite uneven distribution of research attention, adjunct direct agents have not shown a strong impact on outcomes, and a refocus on pharmacological agents may prove beneficial. **LEARNING OBJECTIVES**: The authors hope to highlight the need of enhancing our PN repair outcomes using easily administered adjuncts. We also hope to enlighten readers on discrepancies and imbalance in the research, and to encourage more follow-through papers.

GP22

Social determinants associated with paediatric burn injury: a population based, case-control study

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PURPOSE: Social determinants of health (SDoH) are a broad range of social and economic factors that influence individual and population health. SDoH have been shown to influence risk of injury. To determine which social determinants influence burn injury in children, a retrospective case-control study was conducted. **METHODS:** Children (<17 years of age) admitted to a Canadian regional burn centre between January 1 1999 and March 30 2017 were matched based on age, sex and geographic location 1:5 with an uninjured cohort. Population level administrative data describing the SDoH, at the Manitoba Center for Health Policy, were compared

between the cohorts. Fourteen SDoH were chosen based on a prior systematic review conducted by the research team. **RESULTS:** Children: from a low-income household; in foster care; from a family that received income assistance; and born to a teen mother were associated with an increased risk of burn injury in Manitoba. **CONCLUSION:** This study identified SDoH that are associated with an increased risk of burn injury. The study supports that children from a low-income household, children in care, from a family that received income assistance, and children born to a teen mother are at an elevated risk of burn injury. Identifying children at increased potential risk allows targeting of burn risk reduction and home safety programs, considerable longterm financial savings and decreased morbidity and mortality for children. **LEARNING OBJECTIVES:** At the end of the presentation, the audience will: 1. Have increased awareness of the importance of preventative medicine for burn injuries. 2. Be able to recognize the influence of an individual's social environment, and which particular aspects may place them at increased risk for burn injury. 3. Be able to describe targeted prevention techniques that may be used for burn injuries.

GP23

Skin graft closure of chronic lower extremity complex wounds in multi-disciplinary ambulatory care: A limb salvage option

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PURPOSE: There is growing concern for quality of life of patients with chronic lower extremity wounds, and associated health care costs. These wounds are synergistically rising with rates of diabetes and obesity.1 Öien and Forssell investigated ulcer healing time using the Swedish Registry of Ulcer Treatment (RUT). The median healing time for all ulcers was 146 days (2009) compared to 63 days (2012) after introduction of the RUT.2 A multidisciplinary team in a new Limb Preservation Clinic (LPC) has designed a wound care flow model involving revascularization, debridement, and negative pressure wound therapy to create a graftable bed before closure. This study aims to evaluate outcomes of patients in the LPC undergoing skin grafting for complex lower extremity wounds. **METHOD:** This is a retrospective chart review of patients treated with partial- thickness skin grafts for complex wounds in the Limb Preservation clinic between July 2017-July 2019. Our institution's Research Ethics Board granted approval. **RESULTS:** Twenty-three patients with complex lower extremity wounds underwent interventions by vascular surgery, wound care nurses, infectious disease specialists and plastic surgery. Angioplasty or bypass for revascularization was performed in 16 patients. Patients underwent debridement and partial thickness skin grafting with application of negative pressure wound therapy dressings under local anesthetic in a minor procedure setting; donor sites were closed primarily. Donor site included volar forearm (15 patients), abdomen (6 patients), and neck (1 patient). Skin graft take was high; 73% (17 patients) had >90% at initial assessment and 14 fully healed at median 50 days. **CONCLUSIONS:** LPC with multidisciplinary specialties provides a novel pathway to achieve rapid surgical closure of complex lower extremity wounds. Skin grafting at the ambulatory clinic is safe, efficient and potentially cost effective for patients, clinicians and the health care system. **LEARNING OBJECTIVES:** 1. Illustrate the multidisciplinary process of the Limb Preservation Clinic.

GP24

To exchange or remain: Comparison of patient reported outcomes of satisfaction between smooth and textured implant based breast reconstruction

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PURPOSE: Breast implant-associated anaplastic large cell lymphoma (BIA-ALCL) and textured implant devices have changed the climate and surgical options in post mastectomy breast reconstruction. In light of the potential for BIA-ALCL risk reduction in removing a textured implant and exchanging for a smooth device, an improved understanding of patient reported outcomes comparing smooth to textured devices is required and timely. **METHOD:** Implant-based breast reconstruction patients with smooth and textured implants from 2009-2017 with at least one postoperative BREAST-Q score were included from surgeons utilizing both surface type devices. Primary outcomes of interest included: mean and median BREAST-Q scores (all five domains) and postoperative complications. **RESULTS:** Overall, 1,131 patients were included (826 smooth implants and 305 textured implants). There was no significant difference in timing and laterality of reconstruction between cohorts. For all BREAST-Q domain scores during the postoperative period (from 3 months to 2 years) there were no significant differences between smooth and textured implants, including satisfaction with breast. Smooth patients experienced significantly more rippling ($p=0.004$) than textured patients, while textured implant patients had higher rates of cellulitis ($p=0.03$) and wound infection ($p=0.018$). **CONCLUSION:** Patients who desire exchange from textured to smooth implants can be counseled that smooth devices do not significantly impact postoperative satisfaction with breasts or health-related quality of life outcomes overall. The impact on outcomes following implant exchange however, remains an unanswered question and research focus. **LEARNING OBJECTIVES:** 1**.** Participants will understand patient reported outcomes of breast reconstruction
with smooth and textured implants 2. Participants will understand differences in complication profiles between patients
receiving smooth and textured implant based breast reconstruction 3. Participants will have objective data to reference when counselling patients who desire to switch from textured to smooth implants

GP26

Burn injury in our region's indigenous population
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PURPOSE: Our Indigenous population is disproportionately affected by injury resulting in significant morbidity and mortality. We seek to understand the characteristics of burn injury in our province's Indigenous population and these people's personal experiences. Our aim is to raise awareness about the specialized needs of this population and provide cultural understanding to inform in-hospital care and repatriation to home communities. **METHOD:** Institutional ethics approval was obtained. Data was collected from our regional burn unit to examine burn characteristics between Indigenous and non-Indigenous burn patients. Both adult and pediatric burn registries were examined. Between 2008-2018 there were 615 patients with data available. Observations were grouped by Indigenous status, age, and urban/rural. Summary tables were constructed and t-tests performed to examine differences between the groups of interest. **RESULTS:** Indigenous burn patients in our region are younger at the time of injury and while they have a similar TBSA they have a considerably longer length of stay. Table 1. Indigenous Non-Indigenous p-value n 156 (25%) 459 (75%) Age in years 21.6 36.5 < 0.0001 Total body surface area 13.6 12.5 0.43 Length of hospital stay 24.2 15.7 0.007. **CONCLUSIONS:** Burn injuries in our Indigenous population account for 25% of admissions although they are only 13% of our population. Despite similar burn size, these injuries result in significantly longer stays in hospital. This may because Indigenous burn patients are more likely to live in rural/remote settings far from specialized burn care compared to non-Indigenous patients. Being far from their home community while in hospital lends itself to unique challenges in this population. **LEARNING OBJECTIVES:** Participants will learn that Indigenous people are at increased risk of burn injury and may require more resources to treat their injury.

GP28

Development of an efficient and free to use procedure tracking application
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PURPOSE: Tracking procedures is an important part of training for any procedure-based residency. No free high quality applications currently exist for tracking procedures. Current options include paper records, electronic spreadsheets, and paid software. We sought to develop a free and efficient procedure tracking application with the goal of increasing resident compliance. **METHOD**: An application was developed using the Dart programming language on the Flutter platform, allowing for usage on both iOS and Android-based cellphones. Procedure names 'auto-fill' from a master list of surgical procedures with minimal user input. This master list dynamically expands when an unknown procedure is entered. Additional information is limited to procedure date and the student's role. This limits insecure collection of patient information and minimizes time spent by the student. The collected information is easily shared with the program director or exported to excel format. **RESULTS**: A free and efficient procedure tracking application was developed. This application allows residents to efficiently track procedures. All plastic surgery residents at the University of Manitoba were invited to use the application, with the majority of residents choosing to switch to the new platform for procedure tracking. Initial response from the resident group has been very positive. **CONCLUSIONS**: A novel procedure-tracking application was developed and is currently free to download on the iOS and Android platform. This application provides an efficient method for tracking procedures, likely decreasing the time required and improving resident compliance. Continued improvements will be integrated as more user feedback is received. **LEARNING OBJECTIVES**: At the end of this presentation, the learner will be able to: 1. List the current limitations of conventional procedure-tracking methods.2. Learn how software can be developed and integrated into a residency program to improve efficiency.

GP29

Potential natural gene therapy in the treatment of recessive dystrophic epidermolysis bullosa (RDEB) in patient with reverse mosaicism
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PURPOSE-RDEB is a genetic disorder characterized by separation of the epidermis from the dermis resulting in the formation of chronic wounds. This incurable condition is caused by a mutation in collagen VII (C7). Reverse mosaicism results in the appearance of healthy skin areas caused by spontaneous mutations. This phenomenon would allow a new therapeutic approach by grafting the mutated areas with reconstructed skin made of revertant cells. The objective is to assess the potential of natural gene therapy for RDEB. **METHODS**-For three patients, revertant and mutated biopsies were characterized by histology and immunofluorescence, the cells were cultured, skin substitutes were produced by the self-assembly method and grafted onto the mouse in order to validate the presence of C7. The dermo- epidermal adhesion of skin substitute was quantified by mechanical detachment tests. **RESULTS**-Analysis of revertant biopsies reveals the absence of dermo- epidermal separation and the greatest presence of C7 compared to biopsies of mutated sites. The C7 has been observed in revertant skin substitutes, but no increase in the dermo-epidermal adhesion strength has been observed. The reverse mosaicism phenotype was not observed after 28 days of transplantation. **CONCLUSIONS**- The production of skin substitutes from revertant cells didn't allow the reproduction of the clinical phenotype, which suggests the presence of a compensatory phenomenon that is not replicated in vitro. Other analyses are currently being performed to track the origin of the revertant phenotype. **LEARNING OBJECTIVES** -After this presentation, participants will be able to define RDEB, to understand the principles of natural gene therapy and to list the advantages of this approach.

GP30

Low infection rate for hand fractures managed with open reduction and internal fixation in Minor Surgery
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PURPOSE: The purpose of this study was to review the rate and type of infectious complications following open reduction and internal fixation (ORIF) of hand fractures in minor surgery. **METHOD:** A two-surgeon retrospective chart review for patients who received ORIF of hand fractures in the minor surgery setting from March 2014-March 2019 was performed. **RESULTS:** Average patient age was 40 with a higher proportion of male patients (36:6). Of the 44 fractures that underwent ORIF, 13 involved a distal phalanx, 4 involved a middle phalanx, 9 involved a proximal phalanx and 18 involved a metacarpal. Two patients had two fractures each. 24 of the 42 cases were already open fractures. Fixation was performed using either plates and screws (17/42), or non-buried Kirschner wires (24/42). One case involved both Kirschner wire and plate fixation. Thirty-eight percent of patients were treated with prophylactic antibiotics. Only two patients developed a post-operative cellulitis, and the only documented case of osteomyelitis involved a 33-year-old male who was assaulted with a metal pipe and sustained an open proximal phalanx of his right third digit, repaired with a plate and four screws. No infectious complications occurred in those who sustained closed fractures. **CONCLUSIONS:** While the minor surgery environment varies significantly from the main operating room, infection rates following open reduction and internal fixation of hand fractures in minor surgery remain low - 7% in open fractures and 0% in closed fractures that were surgically opened for the purpose of operative fixation. **LEARNING OBJECTIVES:** Understand the safety profile of performing open reduction and internal fixation of hand fractures in minor surgery.

GP31

Single digit index finger amputation – to replant or not?
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PURPOSE: Single index finger replantation is often listed as a contraindication to replant or considered a hindrance to hand function when replanted. However, recent studies demonstrate comparable subjective and global functional outcomes for index flexor zone II digit replants to revision amputations. We, therefore, sought to identify current opinions of surgeons treating single index finger zone II amputations. **METHOD**: A survey assessing whether plastic surgery trainees and staff would replant a single index finger, zone II amputation was created using a cloud-based software. With approval from the Canadian Society of Plastic Surgery (CSPS), the survey was sent to email addresses of all listed members. Participation was voluntary and survey responses were compiled and analyzed using SPSS statistical software. **RESULTS**: Survey response rate was 41.2%. When asked whether the surgeon would replant a single index digit, flexor zone II, sharp amputation, 55.3% of respondents chose 'yes', while 44.7% responded 'no'. Staff (49.5%) were less likely to replant a single index digit amputation when compared to residents (64.7%). Of those who initially opted to replant, the likelihood of replant dropped substantially in crush (12.4%) and avulsion (17.1%) injury. Smoking was the most likely patient characteristic to change a surgeon's decision (61.9%) followed by a manual labor profession (36.2%). Poor range of motion and poor patient satisfaction were the most frequently listed primary (51.0% and 29.6%) reasons not to replant. **CONCLUSIONS**: There exists stark disagreement on how single index flexor zone II amputations should be managed. Injury and patient characteristics that affect outcomes should be reviewed. Labeling these injuries as a contraindication for replant should also be revisited. **LEARNING OBJECTIVES:** Participants will be able to identify relevant injury and patient characteristics that impact functional and subjective outcome measures of single digit replantation

RESIDENTS POSTER CORNER

RP01

Level 3 Oncoplastic breast reconstruction - techniques, outcomes and logistical considerations
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PURPOSE: Oncoplastic Breast Reconstruction (OPBR) is a challenging field with growing demand. Our study aims to analyze selection, surgical techniques and outcomes of patients who underwent a large volume lumpectomy (20-50% volume or level 3) with OPBR at a single centre. Secondary outcomes include a descriptive analysis of interdisciplinary operative planning logistics. **METHODS**: A retrospective chart review of patients in a single centre who underwent level 3 OPBR between July 1, 2016 and September 1, 2019 in London, Ontario was conducted. Data collected included demographics, surgical techniques, tumour characteristics, and patient outcomes. **RESULTS**: Twenty-four patients were identified to have received level 3 OPBR. Average age and BMI at surgery were 53.6 (37-73) years and 31.2 (21.7-46.4) kg/m2 respectively. Breast cup size ranged from C-DDD cup, and all breasts had grade 2 or 3 ptosis. Average oncologic resection weight was 176.2 (54 - 446) grams. Wise-pattern dermoglandular flaps were used for all 24 OPBRs. The nipple areolar complex (NAC) was preserved in 23 breasts, and excised in 1. Seventeen breasts required two or more dermoglandular pedicles to fill the lumpectomy defect. No skin flap or NAC necrosis were reported in the OPBR breasts. **CONCLUSIONS**: Breast-conservation is a challenge for larger cancers requiring excision of 20-50% breast volume. Such cases are classified as Level 3 oncoplastic cases and benefit from the expertise of plastic surgeons to optimize aesthetic outcomes. In our study, various dermoglandular and adipofascial flaps were employed, alone or in combination, to address these large lumpectomy defects, with good cosmesis and no reports of skin flap or NAC necrosis. **LEARNING OBJECTIVES**: 1. Define OPBR 2. Recognize various dermoglandular and adipofascial flap options utilized in OPBR 3. Recognize the value of multi-disciplinary team dynamics in the practice of OPBR

RP02 – First Prize for a Poster presented by a Resident

Denervation as a treatment for osteoarthritis in the small joints of the hand: A systematic review
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PURPOSE: When conservative treatment options for hand osteoarthritis fail, surgical interventions such as osteotomies, arthroplasties and arthrodeses are pursued. However, each of these interventions are invasive and carry inherent limitations. Joint denervation was proposed as a less invasive option that maintains bony anatomy while alleviating pain. Herein we describe the first systematic review and synthesis of current evidence to assess the effectiveness and complication profile of denervation as a treatment for hand osteoarthritis. **METHODS:** A systematic review of four peer-reviewed databases was performed in accordance with PRISMA guidelines. Screening was performed in duplicate with quantitative and qualitative data abstraction.
RESULTS: Ten relevant studies, with 203 patients, were included in the review. Seven articles described denervation in the first carpometacarpal joint, while the remaining three described denervation in the metacarpophalangeal joint, proximal interphalangeal joint and distal interphalangeal joint. In all included studies, pain was decreased and function was increased post-operatively. Combined analysis of three papers describing CMC denervation revealed significant decrease in pain ($p<0.001$). The mean complication rate across all studies was 16% (n= 30/184). The most commonly reported complication was neuropathic pain or sensory loss, seen in 9.7% (n = 18/184) of included patients. **CONCLUSION**: Findings of this review suggest denervation is an effective and low morbidity procedure for the treatment of osteoarthritis in the hand. Denervation can serve as a useful tool in the hand surgeon's armamentarium, particularly for patients failing nonoperative management and looking to pursue less invasive surgical management. Further prospective comparative studies are required to develop a more comprehensive understanding of the outcomes of denervation, especially in comparison to more conventional procedures of osteotomy, arthroplasty and arthrodesis.
LEARNING OBJECTIVES: 1. Describe limitations of current operative options for hand osteoarthritis; 2. Understand current evidence on the technique and outcomes for denervation as a treatment for hand osteoarthritis.

RP03

Suture enlocation of mandibular condyle fractures: A technical description and case series
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PURPOSE: Open reduction and internal fixation of mandibular condylar fractures demonstrates superior outcomes to non-operative management for selected patients. In patients with comminuted, intraarticular fractures, a novel Suture Enlocation (SE) approach is proposed as an effective method to manage condylar position. This paper will describe the SE approach and illustrate the outcomes with a case series. **METHOD:** This study is a review of patients who underwent repair of condylar fractures between 2009?2019 using the SE approach. Health records and images were reviewed. The main outcomes at the last follow-up include diet, inter-incisal opening, occlusion and pain. **RESULTS:** Through a preauricular incision, the condylar fragment is visualized and reduced, a suture is then employed to provide enlocation of the condyle. A hole is drilled through the largest articular condylar fragment, and a PDS suture is then passed, retrieved, and fixed to the periosteum. Occlusion is managed with class 2 elastics. Indications include fracture dislocation, malocclusion, and inadequate surface area for traditional fixation. Seven patients and nine condyles were included. The age at time of injury ranged from 12?51 years and the time from injury to surgery ranged from 2-8 days. CT confirmed the presence of mandibular condyle fractures which would benefit from the SE approach. Follow-up ranged from 3-13 appointments. All patients progressed their diet; five patients had normal inter-incisal opening; three patients had normal occlusion, two had crossbite, two had anterior open-bite; and four patients reported discomfort or pain at last follow-up. One patient was considered a failure of the SE approach.
CONCLUSIONS: Seven patients with nine mandibular condyle fractures illustrate the benefit of a novel SE approach. **LEARNING OBJECTIVES:** 1. A novel Suture Enlocation approach is proposed as an effective option for operative management of comminuted intraarticular mandibular condylar fractures when indicated.

RP04 - Second Prize for a Poster presented by a Resident

Adherence of clinical referrals to ABA criteria in a tertiary care burn centre: A retrospect review
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INTRODUCTION: Burns are dynamic injuries, which makes patient triage for appropriate treatment difficult. The American Burn Association (ABA) created criteria to help identify patients that may require referral to a specialized burn center, but despite these guidelines, many patients are triaged inappropriately. **PURPOSE**: To characterize the regional referral patterns of burn patients to a tertiary burn clinic and determine the adherence of these referrals to ABA criteria. **MATERIALS AND METHODS**: A retrospective review of all burn patients presenting to a regional burn referral clinic between 2018 and 2019 was performed. Patient demographics and specific burn information was acquired from patient charts including burn depth, size, and source. This database was then analyzed for appropriateness of referral in comparison to ABA guidelines. **RESULTS**: A total of 137 patients (48 Females, 89 Males) were included, with an average age of 28.3 years (range 0.5-87 years). Causes of burns were: 44 contact, 34 flame, 34 scald, 13 grease, 6 chemical, 4 other, and 2 electrical. There were 10 superficial burns, 91 superficial partial thickness, 21 deep partial thickness, and 15 full thickness burns. Average number of clinic visits per patient was 2. Eighty-five patients had fully healed wounds at their first visit, with 91% of these having a <1% total body surface area wound. In total, 88% of consults met ABA criteria. **CONCLUSION**: Although the majority of referrals met ABA criteria, over half of cases were healed

on first presentation. This may imply that although injuries meet ABA criteria, some patients may be appropriate for primary care follow-up allowing for improved specialty clinic utilization. **LEARNING OBJECTIVES**: 1. Understand common burn presentations that prompt specialist referral; 2. Identify teachable points to improve burn patient triage

RP05

Canadian trends in post-operative management following microsurgical lower limb reconstruction: A cross-sectional survey

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PURPOSE: Microsurgical free tissue transfers have become essential and are often used as first line options for lower limb reconstruction, allowing safe and effective reconstruction after trauma, oncological resections and complex wounds. The peri-operative management of fascio-cutaneous free flaps includes many factors aimed at mitigating the risk of microvascular complications. However, optimal management remains controversial. This study aims to assess the current state of practice among Canadian microsurgeons. **METHOD:** 56 Canadian microsurgeons were approached to complete an online questionnaire. The survey evaluated specific areas of interest regarding the post-operative (PO) management of fascio-cutaneous free flaps used for lower limb reconstruction. Trends in protocol timing and duration, use of venous couplers, application of compressive garments, thromboprophylaxis and surgeons? satisfaction with their protocol were assessed. **RESULTS:** 28 surgeons responded and 57% did not have a specific mobilization protocol. Dangling was mainly initiated on PO days 5-6 (44.4%). The most common duration was 5-6 days (43%). Reducing prolonged venous pooling was the most common reason for delay of dangling (71.4%). Compressive garments were placed routinely by 12 surgeons (43%). Venous couplers were routinely used by 24 surgeons (85.7%). Trends in management were influenced by previous training in 53.6% of cases (vs. EBM 7.1%). Although 89.3% were satisfied with their approach, 92.8% would consider changing practice if higher-level evidence were available. **CONCLUSIONS:** The majority of Canadian microsurgeons initiate dangling early following lower limb reconstruction using fascio-cutaneous free flaps. Venous couplers are used by the majority. However, the use of compressive garments is limited. Trends in management are largely based on personal experience and almost all surgeons would consider changing their practice if higher lever evidence were available. **LEARNING OBJECTIVES:** 1. Participants will understand Canadian trends in peri-operative management of microsurgical free flaps. 2. Participants will understand the necessity for further studies in this domain.