ABSTRACTS/RÉSUMÉS

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01
VASCULAR TERRITORIES OF THE ARTERIAL PERFORATORS IN THE LEG
CR Geddes, RP Thomas, SF Morris

INTRODUCTION: Perforator flaps are increasingly indicated for the often problematic coverage of soft tissue defects in the leg. Knowledge of the vascular supply of the skin is helpful in selecting free or pedicled flaps based on perforator vessels. The objective of this study was to document the vascular supply to the skin of the leg with reference to diameter, pedicle length, location and area supplied by perforator vessels.

METHODS: A series of 15 fresh human cadavers were injected with the modified lead oxide and gelatin technique. The skin was meticulously dissected preserving all perforators (≥ 0.5 mm in diameter) and their source vessels carefully noting its course through the septa or muscle. Angiograms of the skin were studied and the vascular territory of the source vessels was calculated.

RESULTS: Seven vascular territories supplied the leg skin. The average number of perforators, percentage of total skin area of the leg supplied, ratio of musculocutaneous to septocutaneous perforators, average diameter (mm), and area supplied (cm²) by each vessel was: Inferior medial genicular [2.4, 6.8%, 3:7, 0.62, 83.2]; Inferior lateral genicular [2.0, 5.3%, 0:1, 0.58, 104]; Descending genicular [6.4, 19.8%, 1:1, 0.84, 254]; Popliteal [4.8, 12.3%, 1:9, 0.87, 280.6]; Posterior Tibial [17.8, 20.8%, 4:1, 0.69, 331]; Anterior Tibial [8.8, 10.0%, 4:10, 0.60, 190.4]; Peroneal [9.8, 11.5%, 7:3, 0.84, 209]. Total number of perforators in the leg was 48 ± 13. The average diameter of the perforators was 0.71 mm.

CONCLUSION: The cutaneous blood supply was studied and perforating vessels from each source artery described. Large perforator vessels supplying the skin were found in each territory that could be used as potential perforator flaps. This study provides a blueprint of the vascular anatomy of the leg that may be useful for preoperative planning of pedicled and/or free skin flaps.

02
THE EFFECT OF TENSION ON END-TO-END NERVE REPAIR
IRP Sunderland, J Singham, M Brenner, SE Mackinnon

INTRODUCTION: Tension across a nerve repair is associated with poor functional outcome. The purpose of this study was to evaluate the effect of various degrees of tension across a nerve repair.

RESULTS: Histomorphometry was used to quantify nerve regeneration. RESULTS: Morphometric data showed robust nerve regeneration in Groups 1, 2, and 3 with no statistically significant differences between groups. In contrast, animals in Group 4 had significantly impaired nerve regeneration as assessed by total number of nerve fibers, percent neural tissue, and nerve density (p<.05). Walking tracks showed a trend of decreasing functional recovery with increasing defect size.

CONCLUSION: This study suggests that low to moderate levels of tension do not adversely affect nerve regeneration while high levels of tension significantly impair recovery. A threshold exists below which nerve regeneration is robust and above which regeneration is poor. The tension threshold in this rat model was 0.41±0.02 N (tensometer force reading) corresponding to a nerve defect of 6mm.

03
MORTALITY IN PATIENTS WITH NECROTIZING FASCIITIS
A Golger, S Ching, CH Goldsmith, RA Pennie, JR Bain

BACKGROUND: The prognostic factors that determine outcome in patients with necrotizing fasciitis remain poorly understood. The aim of this study was to analyze the variables that affect the mortality of patients with necrotizing fasciitis and to create a model to estimate the probability of mortality.

METHODS: We undertook a retrospective review of all patients with necrotizing fasciitis treated in three Hamilton hospitals between 1994 and 2001. Using logistic regression analysis, probability estimates for the prediction of mortality were developed based on three independent factors.

RESULTS: Overall mortality was 20%. Age [odds ratio 1.04, 95% CI 1.01 to 1.08; p=0.012], streptococcal toxic shock syndrome (STSS) [odds ratio 10.54, 95% CI 2.80 to 39.44; p<0.001] and immunocompromised status [odds ratio 3.97, 95% CI 1.04 to 15.19; p=0.044] were independent predictors of mortality. Estimated mortality corresponded to patients’ decade of life (i.e. first decade 1%, second 2% mortality) when the risk factors (STSS and immunocompromise) were absent. The fourth, fifth and older decades corresponded to 6%, 9% and 14% respectively. When the patient was...
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immunocompromised, the risk of mortality was increased four-fold (i.e. first decade 4% mortality). If the patient was immunocompetent but developed STSS, the risk of mortality was increased ten-fold. And finally, when both risk factors were present the multiple was 40.

CONCLUSIONS: Age, STSS and immunocompromised status are significant determinants of mortality and can predict the probability of death from necrotizing fasciitis soon after admission. This objective information may guide clinicians in communications with patients and in making clinical decisions.

04 INTRAVENOUS IMMUNOGLOBULIN DOES NOT IMPROVE OUTCOME IN TOXIC EPIDERMAL NECROSIS
R Shortt, M Gomez, N Mittmann, R Cartotto

INTRODUCTION: Intravenous Immunoglobulin (IVIG) has been proposed as a beneficial therapy for Toxic Epidermal Necrolysis (TEN).

PURPOSE: To compare outcomes in TEN patients treated with IVIG (IG group), with those of TEN patients who did not receive IVIG (Control group).

METHODS: Retrospective cohort review of the records of all TEN patients admitted between 4/5/95 and 12/4/02.

RESULTS: There were 16 patients in each group. Although IG patients were admitted earlier following diagnosis than Control patients (48 ± 26 vs. 91 ± 69 days, p = 0.04), there were no other differences between the groups with respect to age, percentage TBSA involved, APACHE II score or steroid use before admission. The IG group received 0.7x±0.2 g/kg/day of IVIG for 4±1.2 days. Otherwise, both groups received similar treatment. There were no differences between the groups with respect to the length of stay, duration of mechanical ventilation, severity of Multiple Organ Dysfunction Syndrome, or the incidence of sepsis. Significant progression of the wound occurred in 2 IG patients and 3 Control patients, while minimal to no wound progression was observed in 13 IG patients and 8 Control patients (p=0.36).

The time to healing did not differ between IG and Control groups. There was no significant difference in the mortality rate between the IG Group (25%) and the Control Group (38%). There were no major complications from IVIG. CONCLUSIONS: IVIG did not improve outcome in our TEN patients, although there may have been a trend towards less severe wound progression.

05 CUTANEOUS DISTRIBUTION OF ARTERIAL PERFORATORS IN THE UPPER EXTREMITY
B Thompson

INTRODUCTION: Flaps based on a single perforator can now be successfully transferred as perforator flaps. Knowledge of size, location and territory supplied by each perforator vessel thus becomes important. The purpose of this anatomical study was to document the cutaneous perforators of the upper extremity in relation to source vessels and anatomical landmarks.

METHODS: A series of 15 fresh human cadavers were injected with the modified lead oxide and gelatin technique. The upper extremity skin was dissected and the number, diameter, type (musculocutaneous or septocutaneous) and anatomic location of the perforating vessels were recorded. Radiographic analysis showed the subcutaneous distribution of the perforators. The vascular territory of each source vessel was marked and the area calculated.

RESULTS: There are 15 vascular territories in the upper extremity. Each territory was marked on the angiogram. The total number of perforators (≥0.5 mm) was 43 ± 9 on the right and 45 ± 9 on the left side. The mean diameter of the perforators was 0.24 mm on the right, and 0.17 mm on the left side. The average area supplied by the individual perforators was 52.8 cm² on the right and 53.5 cm² on the left side.

CONCLUSION: The perforator vessels of the upper extremity were described and a map of the vascular territory supplied by each source vessel was constructed. From these maps we can predict with reasonable accuracy the source vessel, location, number and size of the perforators in a given anatomical region. This knowledge will assist surgeons in defining potential pedicled and free skin flaps of the various vascular territories of the upper extremity.

06 A NOVEL STRATEGY FOR 24H UNINTERRUPTED PROTECTION OF SKELETAL MUSCLE AGAINST INFARCTION BY NON-INVASIVE, REMOTE ISCHEMIC PRECONDITIONING (IPC)
N A Moses, PD Addison, PC Neligan, A Zhong, CR Forrest, CY Pang

INTRODUCTION: We previously demonstrated that remote IPC with three cycles of 10 min ischemia/reperfusion of a hind-limb by tourniquet application protected the pig latissimus dorsi (LD) muscle flap against infarction. However, this protection begins to wane after 4h and disappeared by 8h. Here, we present a new technique which provides uninterrupted infarct protection for 24h after IPC.

METHODS: In one group, LD muscle flaps were subjected to 4h of ischemia at 1, 8, or 24h after a single remote IPC (n=6 pigs). In another group, remote IPC was performed twice, 24h apart. LD muscle flaps were subjected to 4h ischemia at 1, 8, or 24h after the second remote IPC (n=6 pigs). Control pigs in each group underwent sham remote IPC. Muscle infarct size was assessed using tetrazolium dye staining technique 24h after reperfusion in all LD muscle flaps.

RESULTS: Single acute remote IPC reduced LD muscle infarction from 43 ± 3% (control) to 14 ± 3%. The protection was lost by 8h following the procedure (46 ± 4%) and reappeared at 24h (28 ± 2%). Repeated remote IPC at 24h and immediately before surgery provided 24h uninterrupted robot infarct protection compared with controls (43 ± 3%) at 1h (20 ± 3%), 8h (11 ± 2%) and 24h (24 ± 2%) after the second IPC.

CONCLUSIONS: We demonstrated a novel strategy for non-invasive, remote IPC that can provide 24h uninterrupted intra- and postoperative protection of muscle flaps against infarction. The mechanism is under investigation. Supported by CIHR

07 DESIGN OF A RANDOMIZED CONTROLLED TRIAL COMPARING ENDOSCOPIC CARPAL TUNNEL RELEASE (ECTR) AND OPEN CARPAL TUNNEL RELEASE (OCTR): A CANADIAN COLLABORATIVE INITIATIVE.
A Thomas, T Haines, C Goldsmith, B O’Brien, K Veltri, E Duka

INTRODUCTION: A Review of Reviews and Meta-Analysis comparing ECTR and OCTR, recently performed in our centre, identified shortcomings in methodological quality of most reviews and randomized Controlled Trials (RCTs). They concluded that ECTR was superior for scar tenderness and strength but worse for reversible nerve injury at 12 weeks. For return to work, the results were inconclusive.

PURPOSE: To invite members of the Canadian Society of Plastic Surgeons to participate in a collaborative RCT comparing ECTR to OCTR.

METHODOLOGY: Plastic surgeons who can perform both procedures will be invited to participate. Study outcomes will include the utility (patient preference) captured by the Health Utility Index (HUI), a generic quality of life scale, the Disabilities of the Arm, Shoulder and Hand (DASH), a disease-specific scale grip pinch strength, resource utilization and return to work/activities of daily living.

Outcomes will be measured prior to surgery and at subsequent intervals up to 1 year. The main analysis of the primary question will be to compare the change in the score of HUI between patients in both groups. The HUI and resource utilization measures will permit a cost-utility analysis. An intention-to-treat analysis will be the analytical strategy and statistical analysis of continuous variables will include Repeated Measures ANOVA and multilevel modeling (or hierarchical linear models). Pilot study data determined the sample size required to be 4400 patients.

DISCUSSION: If 50 surgeons contributed 100 patients each, the trial could be completed in 2 years. Canada-wide participation will enhance generalizability and participating surgeons will be identified. Surgeons who are affiliated with academic institutions may use the study for promotion purposes while community surgeons may use it for MOCOMP credits.

08 PATIENT FACTORS ACCOUNT FOR MORE VARIABILITY THAN RATER FACTORS IN THE ASSESSMENT OF OBSTETRICAL BRACHIAL PLEXUS Palsy
HM Clarke, CG Curtis, D Andrews

PURPOSE: Previous work has demonstrated that the Active Movement Scale is reliable when used by 2 physiotherapists who were experienced with the tool. The purpose of this study was to examine patient and rater factors in infants with obstetrical brachial plexus palsy when evaluated by physiotherapists with varying amounts of experience.
METHODS: Research Ethics Board approval was obtained for this study. 10 pediatric physiotherapists attended a 1.5 hour instructional workshop on the administration of the tool. On the following day a study was conducted where 30 assessments of 10 infants by 10 raters were obtained using a chain block design. Each rater evaluated 15 movements of the affected upper extremity of 3 infants. General linear 2-way analysis of variance was conducted to determine the variation in scores due to patient and rater factors. Box plots were constructed to compare the variability of factors between and within raters and patients.

RESULTS: Review of the patient demographics indicated a highly varied sample. Rater experience using the scale ranged from none (6 raters) to over 50 patients (2 raters). Box plots of the variance coefficients indicated that the raters were able to evaluate the patients with a high degree of precision. The variability of scores due to rater factors was low compared with patient factors and the variation in scores due to rater experience was minimal.

CONCLUSIONS: With minimal training, raters with a wide range of previous experience using the Active Movements Scale were able to reliably evaluate infants with upper extremity paralysis.

09 PREDICTORS OF VELOPHARYNGEAL INSUFFICIENCY (VPI) IN CLEFT PALATE ORTHOGNATHIC SURGERY
JH Phillips, P Klaiman, R Delorey, B MacDonald
PURPOSE: The purpose of this study was to appraise the value of preoperative speech assessments, nasopharyngoscopy, and surgical models as predictors of velopharyngeal deterioration after a LeFort I maxillary advancement in cleft patient.

METHODS: This retrospective study involved a series of 26 cleft patients for whom preoperative and postoperative assessments were available (16 unilateral complete and 9 unilateral complete cleft lip and palate, and 1 isolated complete cleft palate) who had LeFort I maxillary advancements between March 1, 1993 and February 7, 1996. The 13 males and 13 females ranged in age from 15.3 to 46 years-of-age (mean 19.5). Four of these patients had previous pharyngeal flap surgery. Eleven patients had palatal fistulas and 1 had a bifid uvula which was repaired at the time of orthognathic surgery. Preoperative assessments with perceptual speech (speech), nasopharyngoscopy (scope), and surgical planning with articulator models (antero-posterior-AP-advancement) were compared with post-operative VP status. The data was statistically analyzed to determine the strength of correlations.

RESULTS: Patients with preoperative hypernasal speech pre-operatively had all had hypernasality after advancement 9 of 9. VPI was observed in 2 of the 16 whose resonance pre-operatively was within normal limits of resonance. Speech assessment, therefore, predicted accurately the post-operative status in 24 of 26 patients. Twelve patients had pre-operative nasopharyngoscopy that indicated a high risk for VPI (borderline or inadequate closure). Nine of these patients had post-operative VPI. Two of the 14 patients not judged at risk by nasopharyngoscopy developed VPI. Therefore, 21 of the 26 patients were accurately predicted by nasopharyngoscopy. Scoping detected borderline VPI in 1 patient who was not detected by speech alone. The combined predictive value of speech and scope identified all but 1 patient that would develop post-operative VPI. The degree of AP movement determined from the surgical models was not predictive of the outcome.

CONCLUSION: Patients with hypernasal speech pre-operatively continue to have hypernasal speech after LeFort I. Pre-operative perceptual speech assessment by specially trained speech-language pathologists is an excellent test for predicting post-operative VP status (24 of 26). Nasopharyngoscopy is an invasive and resource dependent tool that should be utilized with respect to cost effectiveness. In this series, only 1 patient’s risk was more accurately predicted using nasopharyngoscopy. The cost-benefit of nasopharyngoscopy raises difficult questions about its application in this patient population.

10 TREATMENT OF THE CLEFT LIP NASAL DEFORMITY: A RATIONAL STEPWISE APPROACH
DM Fisher
A rational treatment plan for correction of the cleft lip nasal deformity (CLND) requires an understanding of the normal anatomy of the nose, the anatomy of the cleft lip nasal deformity, and an appreciation of the mechanism responsible for the deformity. In 1997 we described a model to describe the mechanism of the CLND (Fisher and Mann, PRS May 1997). The model supports the original conclusions of Huffman and Lierie; the CLND is due to structures of the nose being held in abnormal position, rather than an intrinsic defect in the developing nose. The nasal deformity cannot be completely corrected at the time of primary chelioplasty because the asymmetry of the underlying skeleton is not corrected. An approach to management of the CLND is outlined which proposes gradual reversal of the nasal deformity (soft tissue, cartilage and bone) in a stepwise fashion at each available opportunity. The approach stresses the avoidance of additional iatrogenic secondary deformities. For complete clefts the protocol includes: 1) presurgical orthodontia, 2) limited primary rhinoplasty at lip repair, 3) modified Potter rhinoplasty after age six years, 4) alar base and lateral pinniform augmentation at alveolar bone grafting at age nine to twelve years, and 5) definitive septorhinoplasty in adolescence. Clinical examples of each stage are discussed.

11 CAN THE DEGREE OF ATROPHY IN NIPPLE RECONSTRUCTIONS BE PREDICTED: A PROSPECTIVE ANALYSIS OF 30 CONSECUTIVE CASES USING THE C-V FLAP
L Sigurdson
Atrophy is common to all techniques of nipple reconstruction. The inability to accurately predict this can make it difficult to match reconstructions to the contralateral side. The purpose of this study was to analyze the degree and time to atrophy in 30 consecutive nipple reconstructions. Subgroup analysis was performed to explore differences in nipple reconstructions performed on TRAM, latissimus and expander reconstructions.

Thirty C-V flaps were created using a standardized template. Intra-operative measurements of skin thickness, flap thickness, circumference, diameter, width and projection were obtained. Measurements were repeated at multiple intervals postoperatively. Data was analyzed using descriptive statistics, ANOVA and paired t-tests. Scatter plots were used to determine time until size stability of the reconstruction.

Average follow-up was 100 days. Atrophy of the nipple reconstructions plateaued at 55 days. Reconstructions on latissimus flaps had the largest initial size, followed by TRAM flaps and expanders. These differences persisted postoperatively.

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<thead>
<tr>
<th></th>
<th>Lattissimus</th>
<th>TRAM</th>
<th>Expander</th>
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</thead>
<tbody>
<tr>
<td>Preoperative Diameter</td>
<td>26.2</td>
<td>25.3</td>
<td>24.9</td>
</tr>
<tr>
<td>Postoperative Diameter</td>
<td>20.0 (-23%)</td>
<td>19.3 (-24%)</td>
<td>16.9 (-32%)</td>
</tr>
<tr>
<td>Projection</td>
<td>10.1</td>
<td>8.9</td>
<td>7.6</td>
</tr>
<tr>
<td>Postoperative Projection</td>
<td>6.4 (-37%)</td>
<td>5.0 (-43%)</td>
<td>4.3 (-43%)</td>
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</tbody>
</table>

Differences in nipple atrophy between flap groups were not statistically significant. Nipple projection can be expected to decrease by 35.9 % (0.95 CI 24.1-47.6) and diameter by 24.9% (0.95 CI 19.1-30.7) regardless of the underlying reconstructive modality. Surgeons should therefore modify nipple reconstructions to allow for the predicted effects of atrophy.

12 A NEW TECHNIQUE FOR SINGLE STAGE BREAST RECONSTRUCTION WITH ADJUSTABLE IMPLANTS
L Ekenazi
Orienting the incisional biopsy scar for optimal results with single stage reconstruction.

Irradiation and breast reconstruction avoiding capsular contracture.

With the wide national acceptance of immediate reconstruction and skin sparing mastectomy and the precipitous decline in reimbursement for all types of breast reconstruction techniques, it is timely to revisit the concept of single stage reconstruction.

The senior author has been using this technique for 12 years in over 300 cases with excellent results and high patient satisfaction. The advantages include a single general anesthetic (in most cases) and a considerably shorter interval from mastectomy until the completion of reconstruction. The interval from immediate reconstruction with mastectomy to completion is 2 months on average, although adjuvant therapy may delay the final result. This technique allows the surgeon to attain the final shape of the breast mound immediately after the first stage. The adjustable implant (Spectrum or Becker) is placed submuscular in the upper pole and subcutaneously in the lower pole of the breast. Using this method allows the patient to continue on with radiation or chemotherapy with minimal or no delay. As with all new operat-
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tions, there is a learning curve but the early results on the way up the learning slope are aesthetically superior to traditional multidrug submuscular reconstruction with an expander/implant technique.

This paper describes the technique itself and reviews our results. We will discuss the timing of chemotherapy and radiation therapy and how to decrease the incidence of capsular contracture during and after radiation. It also describes the placement of the surgical biopsy and the necessity for good communication with our general surgical colleagues in order to achieve optimal and reliable results.

Complications are few and the author discusses methods for avoiding the high complication rate associated with other techniques of immediate implant/expander reconstruction.

13 EVALUATION OF POLYMETHYL METHACRYLATE ADHESION. A COMPARISON OF DIRECT ONLAY VS. SCREW ANCHORING TECHNIQUES

A. Nikolaou, A. Moreira-Gonzalez, Y. Tiftikcioglu, J. T. Jackson

Cranioplasty is one of the most commonly performed procedures in craniofacial surgery. Traditionally, polymethylmethacrylate has been the material used for both aesthetic and reconstructive purposes since it is well tolerated by dura, bone, and the surrounding soft tissues. However, this material may become loose over time due to its poor adherence to bone. A series of experiments have been undertaken to evaluate and improve this adhesion force.

A digital pull force gauge was used to assess the force required to separate Polymethylmethacrylate from the bony surface of fresh cadaver heads with:

1. Increasing contact surface areas
2. A constant area of 16 cm² with increasing numbers of miniscrews.

Experiment 1: Larger separation forces were required as the surface area of Polymethylmethacrylate application increased (1.2-42.3N). The most consistent results, there is a learning curve but the early results on the way up the learning slope are aesthetically superior to traditional multidrug submuscular reconstruction with an expander/implant technique.

The rate of intraoperative (47% vs. 0%) and postoperative (53% vs. 22%) complication was significantly greater for TCV (2100 vs. 1500 cc). Patients undergoing TCV required blood products of all types with greater frequency and in greater volume. Transfusion with only directed units was possible for over (43%) age groups with lesser numbers in the under 5 (9%) group.

The mechanisms and pattern of facial fractures in this series is markedly different from previous demographic studies. Possible reasons for the differences include effects of public safety initiatives and inherent regional differences between study populations. Most fractures required surgical intervention and conservative techniques were favored; complications were rare. Cervical spine fractures were not associated with facial bone injuries in this series.

15 BIORESORBABLE FIXATION IN PEDIATRIC CRANIOSYNOSTOSIS SURGERY – A SIX-YEAR EXPERIENCE

G. Louie

Craniosynostosis is the premature fusion of cranial vault sutures. Surgical correction undertaken during infancy usually entails cranial vault remodeling along with frontal orbital advancement. Operative bone segment stabilization has relied upon interosseous wire or bone plate and screw fixation. However there have been a number of concerns regarding the use of these methods of fixation in infants. Passive translocation of metallic fixation materials through bone associated with growth has led to endocranial migration of these devices. Furthermore, hardware buried within bone may complicate secondary surgery. Palpability, visibility, or associated discomfort of the hardware may necessitate their removal. Finally their contribution to growth restriction remains uncertain. For these reasons, alternative means of fixation have been sought.

A number of proprietary resorbable fixation systems have been developed. These systems utilize plates and screws composed of alpha-hydroxy acid copolymers. They are heat adaptable thermoplastics that become malleable when heated facilitating plate adaption to bone surfaces and they regain rigidity when cooled. They are completely eliminated physiologically by hydrolysis and cellular inflammatory responses.

At the Stollery Children's Health Centre, University of Alberta Hospital in Edmonton, a retrospective chart review identified 42 consecutive infants whose craniosynostosis surgery utilized bioresorbable fixation between 1997 and 2002. Three systems have been used (Lorentz Lactosorb, Synthes Resorbable and Leibinger Delta).

Our six year experience with bioresorbable fixation will be reviewed. Technical consideration in their application will be illustrated by representative case studies. Comparison with use of resorbable metallic fixation in a similar patient population between 1992 and 1997 will be undertaken.
17 MUSCLE FLAP CLOSURE OF PEDIATRIC STERNAL WOUNDS: THE BCCH EXPERIENCE

CA Lavelle, DJ Courtemanche, S Sett, J Leblanc

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METHODS: Intervals from the time of injury to surgery were extracted from 28 patient charts that underwent microsurgical replantation at a university based level-one trauma center in Quebec. 14 patients were referred from 14 peripheral hospitals that do not provide microsurgical replantation care. The Administrative Head of the Emergency Department at each of the hospitals were surveyed to determine if any difficulties were encountered with patient transfers. Microsurgeons rendering treatment were surveyed to determine if any difficulties were encountered with delivery of care.

RESULTS:

<table>
<thead>
<tr>
<th></th>
<th>Referrals (Mean)</th>
<th>Max</th>
<th>Min</th>
<th>Direct to Centre (Mean)</th>
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<th>Min</th>
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<tr>
<td>to Referring Hospital</td>
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<tr>
<td>Delay in Referring</td>
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<tr>
<td>Hospital until Transfer</td>
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<tr>
<td>Time Duration of Transfer</td>
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<td>Average Distance of Referring Hospital</td>
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<tr>
<td>Total Delay to MUHC</td>
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<td>7:45</td>
<td>1:15</td>
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<td>0:20</td>
<td>3:03</td>
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<tr>
<td>Total Delay</td>
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<td>13:05</td>
<td>4:29</td>
<td>3:35</td>
<td>5:45</td>
<td>2:25</td>
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</table>

CONCLUSION: The use of local muscle flaps is a safe and effective method for closure of pediatric sternal wounds.
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23 THE ANATOMICAL BASIS OF THE PRONATOR QUADRATUS FLAP
BP Thomas

INTRODUCTION: The pronator quadratus muscle appears to be a good choice for pedicled or free flap tissue transfer in some specific situations. There are few reports regarding the reconstructive potential of the pronator quadratus muscle. In this anatomical study, our objective was to comprehensively document the neurovascular anatomy of the pronator quadratus for use as a free or pedicled muscle transfer.

METHODS: In this 2 part study, 14 fresh human cadavers underwent intra-arterial injection using a radio-opaque injectate of lead oxide, gelatin mixture. The pronator quadratus muscle and the anterior interosseous (AI) artery, vein and nerve, radial and ulnar arteries and their venae comitantes were dissected. As well, six preserved cadavers (2 males and 4 females) were injected with India ink and gelatin via the subclavian artery and the muscle with its vascular pedicles were studied.

RESULTS: The dominant vascular pedicle was from AI vessel with minor pedicles from radial and ulnar arteries. The average length of the major pedicle was 9.6 mm (9.0-10.3 mm). The mean diameter was 2.3 mm for the artery and 2.8 mm for the vein. The length of the nerve after the branch to flexor pollicis longus muscle was 4.8 cm (4.0 to 7.5 cm). The dimensions of the muscle was 5.5 x 5.0 cm². A dorsal branch from the AI artery supplied the skin of the dorsum of the forearm over an area of mean 20.8 cm², via 3 to 4 perforators. This branch also anastomosed with the 1,2 intracompartmental supraretinacular artery (ICRSA) branch of the radial artery.

CONCLUSIONS: The pronator quadratus can be classified as a Type II muscle flap with one major and 2 minor pedicles. The vascular anatomy is reliable with medium sized vessels and can be used as a free or pedicled flap. The skin island can also be harvested along with the muscle.

24 PREPLANNING THE CORRECTION OF MAMMARY ASYMMETRY
G Brody

Matching an undesirably shaped or sized breast to itsesthetic mate challenges the artistic skills and spatial perspectives of the surgeon. Most surgeons rely on freehand intra operative sculpting, which even in the best of hands is imprecise. By simple techniques, the volume adjustment (up or down) and skin envelope pattern can be accurately pre-determined.

Volume changes can be pre-determined by simple measurements of the discrepancy by filling the smaller bra cup with water filled plastic bags. These are preferable to implant sizes as when under-filled they drape well to fill all recesses of the cup. Thus the volume to be added or subtracted can be predicted with some precision. Reduction of the skin envelope can also be accurately predetermined by creating a tape template of the normal or desired side and transferring it to the side to be reduced.

When both sides are to be adjusted this system can be used intra operatively after one side is corrected.

Examples demonstrating the versatility of this technique with various deformities will be presented.

25 A QUALITATIVE ANALYSIS OF BREAST HYPERTROPHY: DO WE REALLY UNDERSTAND HOW THESE PATIENTS SUFFER?
I Sigurdson, A Pallen

Breast (mammary) hypertrophy is a common condition and can be associated with significant morbidity. Symptoms that physicians tend to be most aware of include physical problems such as pain, poor posture and exercise restrictions. The purpose of this study was to explore the suffering experienced by women with breast hypertrophy and prioritise symptom importance.

Twenty-one women with breast hypertrophy were divided into 5 focus groups. A facilitator guided a semi-structured interview. Open discussion was encouraged to generate a comprehensive list of symptoms faced by women with breast hypertrophy.

Subjects then completed an iterative process to numerically determine the relative importance of each symptom. Conversations were recorded, transcribed and analyzed using Nvivo® software.

A weighted list of 45 dominant symptoms was created from an initial pool of 128. Physical pain symptoms predominated in the older age group while younger women expressed more psychological symptoms. Difficulties experienced by these women transcended all aspects of their lives. Back, neck and shoulder pain were considered most troublesome followed by exercise difficulties, poor posture and low self-esteem.
This study provides insight into the burden of breast hypertrophy and has implications for the quantification of the condition.

26 THE DIFFICULT MALE BREAST
K Rai

The purpose of this paper is to present surgical techniques and planning for achieving acceptable results in difficult male breast contouring.

This is done by appropriate planning with the use of a combination of procedures, namely: A. the use of ultrasound liposuction supplemented with or without circumareolar mastopexy to minimize scars. B. limited glandular excision. C. use of compression garments to achieve shrinkage.

The chest and trunk are treated by ultrasound liposuction of the chest and breast and extended onto the submammary crease, the anterior axillary fold, the prepectoral area, and sometimes even the upper abdomen. Only minimal glandular excision of the areolar complex may be needed. Sculpting of the chest, abdomen and back by ultrasound liposculpturing compliments the outcome.

Excisional surgical procedures of the glandular component of the breast tend to present contour defect deformities of the chest wall. These may need reconstructive procedures to correct contour defects and usage of local tissue with fat flap to help improve the contouring deformity and tissue defect. One such technique is presented. In post-weight loss patients, with grade III ptosis of the chest, circumareolar mastopexy with ultrasound liposuction gives satisfactory results, which are very acceptable, both to the patient and surgeon.

In management of the difficult male breast, a combination of surgical procedures are needed to get satisfactory results, eg. 1. ultrasound liposculpturing. 2. conservative glandular excision. 3. circumareolar mastopexy in post-weight loss or grade III ptosis needed to get satisfactory results, eg. 1. ultrasound liposculpturing. 2. conservative glandular excision. 3. circumareolar mastopexy in post-weight loss or grade III ptosis of the breast. In contour defects of the chest, usage of local tissue flaps within the breast tissue itself, gives good results without the need of any auto-fat grafting. A case is presented.

In conclusion, in a difficult male breast, ideal results can be achieved by using a combination of procedures always keeping in mind the patients aesthetic profile.

27 MANAGEMENT OF INFECTED OR EXPOSED TISSUE EXPANDERS USED FOR RECONSTRUCTION OF THE BREAST
PJ Oxley, PA Clugston, PA Lennox

INTRODUCTION: Breast reconstruction can be performed with either autologous tissue techniques, or by the use of tissue expansion and permanent implants. Tissue expander reconstruction is associated with the known risks of infection and device exposure. The management of these complications historically has involved removal of the device followed by a period of time to allow tissue healing before re-attempting reconstruction. An attempt has been made at this centre to salvage expanders where possible.

HYPOTHESIS: Tissue expander breast reconstruction can be salvaged in a select group of patients.

METHODS: A three year retrospective review of non-autologous breast reconstruction was performed.

RESULTS: One hundred and seventy-seven patients underwent tissue expander and implant reconstruction of 254 breasts following mastectomy. Of these, eleven expanders in ten patients required salvage procedures. Seven (2.8% of total) of these were for infection and four (1.6% of total) were for dehiscence of the mastectomy incision associated with marginal necrosis of the mastectomy flaps with frank or imminent expander exposure. Six reconstructions were salvaged by debridement and irrigation of the pocket with antibiotic solution and replacement with the original expander over a closed suction drain. This included two due to infection and four due to exposure. All patients received pre and post-operative antibiotics. Five reconstructions in four patients were abandoned at the time of re-operation due to clinical assessment of significant periprosthetic infection. The six salvaged patients all went on to implant reconstruction and have had no recurrence of exposure or infection with average follow-up of 16 months (3-26 months).

CONCLUSION: Salvage of tissue expanders used in breast reconstruction following clinical exposure or infection is reasonable to attempt in a select group of patients.

28 MACROREPLANTATION: IMMEDIATE AND LONG-TERM FUNCTIONAL OUTCOMES
IC Lin, B Shankland, N Brisebois, A Chollet, ME Bissonnette, JF St-Laurent, B Madraspoua

Successful replantation of amputated limbs has been well demonstrated in the literature. However, few reports have described the long-term functional outcome of these successful surgeries. We used a series of 17 cases of major limb replantation to determine the immediate post-operative outcome and long-term functional outcome of macroreplantation. 17 major replantations were performed between 1987 and 2000 at the Hôpital Maisonneuve-Rosemont in Montreal, including four arms, two feet, three forearms and eight hands. Patients ranged in age from two to 60 years. Average length of time between time of trauma and start of surgery was six hours. Average duration of surgery was 11.4 hours. No post-operative complications were recorded for six of the 17 patients (five hands and one forearm). Most common immediate complication was infection (1/11). Thrombosis or rupture of vascular anastomoses were reported in five patients. Of the four arm replantations, one patient died of massive hemorrhage on post-operative day four, one was amputated on post-operative day 20 following anastamotic rupture, and one was amputated five and a half months following the initial operation due to infection. One forearm replant was amputated at post-operative day four due to infection. All other replant surgeries were successful (13/17). Long-term evaluation of replant patients is currently being evaluated using the DASH (Disabilities of the Arm, Shoulder and Hand) and SF-36 questionnaires.

Functional outcome testing of range of motion, grip strength, 2-point discrimination and day-to-day use of replanted part is also ongoing. Results of these evaluations will be presented.

29 POSITIONAL PLAGIOCEPHALY: WHAT IS THE NATURAL HISTORY?
MA Minegaro, JH Phillips, CR Forrest

INTRODUCTION: Positional plagiocephaly is the result of abnormal forces acting on an intrinsically normal skull resulting in an asymmetric cranial vault. While positional plagiocephaly does not represent true cranial pathology, significant confusion exists regarding its natural history and treatment.

PURPOSE: To assess the natural history of cranial vault asymmetry secondary to positional plagiocephaly in patients treated with counterpositioning measures.

METHODS: Twenty infants (mean age=9.8 months) identified through a positional plagiocephaly symposium were followed over a one year period. A total of 12 anthropometric measures were recorded at the time of initial assessment, 6 and 12 months post. Measures of cranial vault asymmetry (CVA), skull base asymmetry (SBA) and orbitotragal depth (OTDA) were calculated. Other data collected included patient demographics, risk factors for development of positional plagiocephaly, and degree of asymmetry. Statistical analysis consisted of repeated measures ANOVA with a significance ascribed to p<0.05.

RESULTS: Of the 20 infants originally identified, 16 were available for follow up with 11 infants having counterpositioning. At 6 months following initial assessment, there were no statistically significant differences in measures of either CVA or SBA. While not statistically significant, there was a trend towards a decrease in OTDA. CONCLUSION: Cranial vault and skull base asymmetries do not appear to change significantly in the first six months following initiation of counterpositioning. A trend towards a decrease in OTDA may represent resolution of facial asymmetry in advance of its cranial counterparts. One year results are pending.

30 BREAST FEEDING FOLLOWING BREAST AUGMENTATION
PJ Oxley, PA Clugston, RJ Warren

INTRODUCTION: Each year in North America thousands of women undergo Augmentation Mammaplasty using a variety of implants and surgical methods. There is considerable debate regarding these women's ability to breast feed following augmentation, and many women are discouraged either from having implants or attempting to breast feed in this circumstance.

HYPOTHESIS: No difference exists in the ability to breast feed between women who receive cosmetic breast augmentation and those who do not.

METHODS: A survey regarding position, incision, and type of implant, as well as specifics of the ability to breast feed was filled out by women who had children following breast augmentation.

RESULTS: Sixty-two women completed surveys. Fifty-five of these women attempt-
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ed breast feeding post partum. Of these, 72% had no difficulty breast feeding, 22% required formula as a significant part of the child's diet, and 6% were unable to breast feed at all. This number matches figures in breast feeding literature in non-augmented patients. No difference was found between type of implant or pocket, though a trend was seen with the trans-areolar incisions being found to be prohibitive towards breast feeding. Twelve of fifteen women reporting placement of implants between children noticed no difference in the ability to breast feed. Of the other three, one did not attempt breast feeding due to hypersensitivity of the nipples, one noticed a decreased amount of milk produced and the last noticed an increase.

CONCLUSIONS: Breast augmentation, regardless of incision location, pocket, or type of implant, does not limit a woman’s ability to breast feed.

31 THE EFFECTS OF TRANSFORMING GROWTH FACTOR-BETA ON CULTURED DUPUYTREN’S FIBROBLASTS IN A COLLAGEN MATRIX
R Tse, J Howard, BS Gan
Dupuytren’s disease is a fibroproliferative disorder of the palmar fascia with no definitive cause. The search for its etiology has shifted from clinical association to molecular biology. Transforming growth factor beta (TGF-ß), an important cytokine involved in wound healing, has been implicated in the pathogenesis of Dupuytren’s contracture. The purpose of this study was to examine the effects of exogenous TGF-ß on cultured Dupuytren’s contracture fibroblasts in a collagen matrix. In diseased cells, collagen gel contraction was significantly faster and to a greater extent than in control cells. The addition of TGF-ß abolished the enhancement of contraction by exogenous TGF-ß, however, addition of the blocking antibodies alone had no effect on basal contraction rates. Interestingly, fluorescent deconvolutional microscopy showed that exogenous TGF-ß caused markedly altered stress fiber formation in diseased cells compared to control cells. We conclude that Dupuytren’s fibroblasts exhibit different phenotypical behaviour in three-dimensional culture, but that this different behaviour is most likely not mediated by endogenous differences in TGF-ß signaling.

CONCLUSIONS: Our findings indicate that RIIB is differentially expressed on human chondrocytes of distinct phenotypes. In OA cells this high level of RIIB expression may contribute to the poor reparative capacity of OA cartilage. RIIB heter-oligomeric complex formation and modulation of TGF-ß responsiveness suggest that the expression of distinct TGF-ß receptors in human chondrocytes may be critical for achieving a fine balance between the positive and the negative regulation of TGF-ß signaling towards cartilage regeneration and repair.

33 IDENTIFICATION OF THE MOLECULAR DETERMINANTS UNDERLYING DUPUYTREN’S DISEASE USING HIGH-DENSITY OLGONUCLEOTIDE MICROARRAYS
S Ching, S Der, BJ Blencowe, JR Bain, A Toma
Dupuytren’s disease is a common, disabling condition of the hands characterized by the formation of pathological nodules and cords in the palmar fascia. Despite a widespread acceptance that Dupuytren’s disease has a heritable basis, the molecular basis for this disease is still not understood. The prior examinations of the molecular mechanisms underlying Dupuytren’s have yielded varied results and have not led to a significant understanding of the disease process. Notably, previous technologies to perform functional genetic studies have been limited to the examination of only a few genes at a time. A powerful new technology, the DNA microarray chip, displays the potential to examine the expression of thousands of genes in a single tissue sample. We have exploited a unique anatomical feature of this disease, where an adjacent layer of palmar fascia termed the transverse fibers, is never affected by Dupuytren’s disease. Key to our study is the ability to compare gene expression patterns detected by DNA microarray analysis between diseased palmar fascia and adjacent, non-diseased transverse fibers from the same patient. The independent validation of genes identified by DNA microarrays will be performed by real-time quantitative PCR (qPCR). This study is in progress and the final results will be available for presentation.

34 BREAST REDUCTION AS AN OUTPATIENT PROCEDURE
CA Lawlor, PA Clagston, PA Lennox, DJ Courtemanche
INTRODUCTION: Rapid changes in the delivery of health care have resulted in changes in patient management. Reduction mammoplasty is one of the most commonly performed elective procedures in plastic surgery, and due to some of these pressures, has been increasingly performed on an outpatient basis. The safety and complication rate of outpatient reduction mammoplasty is not well established in the literature.

HYPOTHESIS: Reduction mammoplasty can be done safely in an outpatient setting.

METHODOLOGY: A retrospective chart review of 246 reduction mammoplasties performed by four surgeons in the UBC hospital system over a three year period was carried out. This group contained inpatients as well as patients who underwent day care procedures. The two groups were then compared.

RESULTS: 246 patients underwent reduction mammoplasty. 63 (25.6%) of these were outpatient procedures, and 183 (74.4%) were inpatients. Paired Student’s t tests revealed no demographic differences between these groups. Operative times were also not significantly different. Resection weights and Body Mass Index (BMI), however, were found to be different between the groups. (p=0.0031, p=0.025) Complication rates and reoperative rates were not statistically different. Chi squared analysis showed that although BMI was different between the groups, this did not have an effect in increasing the incidence of complications in either group.

CONCLUSION: Outpatient reduction mammoplasty is not associated with increased risk of complication or reoperation in appropriately selected patients.

35 COMPARISON OF DIEP FLAP AND FREE TRAM FLAP IN POST-MASTECTOMY RECONSTRUCTION: A COST-UTILITY ANALYSIS
D Khuthaila, A Thoma
INTRODUCTION: The deep inferior epigastric perforator flap is becoming an increasingly popular technique for post mastectomy breast reconstruction because it supposedly reduces abdominal weakness and hernia.

PURPOSE: The purpose of this study is to compare the DIEP flap to the free TRAM flap and see if the DIEP is cost-effective.

MATERIALS AND METHODS: A decision Analytic Model and a Ministry of
Health perspective were used for this study. Hospital costs were obtained from St. Joseph’s Hospital, in Hamilton, Ontario. Utilities were obtained from a sample of convenience of 33 plastic surgeons across Canada. Utilities were converted into Quality Adjusted Life Years (QALYs). The probabilities of the various health states, associated with the DIEP and free TRAM flaps were obtained by reviewing the recent literature dealing with complications of the DIEP.

An Incremental Cost-Utility Ratio (ICUR) was calculated. A sensitivity analysis was also performed by increasing the probabilities of key complications associated with the DIEP flap and the results were stable.

RESULTS: The ICUR = $418.737/QALY. This study has shown that the DIEP flap is a cost-effective procedure and there is strong evidence for its adoption. However there is a need to collect sampled data directly from patients in a randomized control trial to compare the two techniques.

36 EVALUATION OF COSMETIC OUTCOMES IN ONCOLOGIC BREAST SURGERY
AJ Fortin, R Skoracki, KA Murray, S Latosinsky

BACKGROUND: Reconstruction of the breast following oncologic resection may have a significant impact on the patient’s psychological recovery. Refined in breast surgery, such as breast conserving therapy and skin sparing techniques in combination with continuous improvements in reconstructive techniques have lead to ever improving cosmetic outcomes. Interestingly, up to 50% of cosmetic outcomes following breast conservation surgery and radiotherapy are considered only fair to poor. To objectively examine how breast reconstruction can improve cosmesis, a measure of aesthetic appearance needs to be established that can be assigned before and after reconstruction. A major methodology issue is that the reliability of scales evaluating cosmetic results have either not been validated or, when they have been assessed, have shown poor reliability. OBJECTIVE: To assess the reliability of scales previously developed to evaluate cosmetic outcome following breast surgery and to evaluate our own modification of available scales.

METHODS: 30 women with a minimum of two years post breast conservation surgery and radiotherapy treatment for breast cancer have been recruited from the Cancer Care Manitoba breast clinic. Participants had standardized photographs taken. Five plastic surgeons evaluated cosmetic outcomes of these photographs on two occasions, three weeks apart, using the most popular scales in the literature A 4-point scale described by Danoff, and a more involved 3-point sub-scale. Inter-rater and intra-rater reliability for each scale were assessed using a kappa statistic and individual assessment categories were evaluated using a multivariate analysis.

CONCLUSIONS: The reliability of measures of cosmetic outcome following breast surgery for cancer patients will be presented.

37 WITHDRAWN

38 LOCALLY ADMINISTERED KETOROLAC AND BUPIVICAINE FOR THE CONTROL OF POSTOPERATIVE PAIN IN BREAST AUGMENTATION PATIENTS
RC Mathur, BD Peterson, JS Williamson, SM Valincek, B East

GOAL: The objective of this study was to test the effectiveness of locally administered, intraoperative Ketorolac and Bupivacaine with epinephrine at reducing pain in the postoperative period.

METHODS: Ethical approval was obtained to perform a prospective, randomized, double-blind, clinical trial. One hundred consecutive breast augmentation patients were enrolled and informed consent was obtained. A standard anesthetic protocol and surgical procedure were followed. Either normal saline, Ketorolac alone, Bupivacaine alone or Ketorolac and Bupivacaine were irrigated into the implant pocket prior to insertion of the implant. The primary outcome was pain as measured by the Visual Analog Pain Scale (VAPS). The secondary outcomes were time spent in the recovery room and analgesic use in the first two days postop. All patients completed the study. The power of this study to detect a 20% difference with respect to the primary outcome was 0.90 and confidence intervals of 95% were used to determine significance.

RESULTS/COMPLICATIONS:

<table>
<thead>
<tr>
<th></th>
<th>Mean VAPS values</th>
<th>Pairwise Comparison with Normal Saline</th>
<th>95% CI</th>
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</thead>
<tbody>
<tr>
<td>Normal Saline</td>
<td>4.15</td>
<td></td>
<td></td>
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<tr>
<td>Ketorolac</td>
<td>2.56</td>
<td>1.59</td>
<td>0.76, 2.42</td>
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<tr>
<td>Bupivacaine</td>
<td>1.65</td>
<td>2.50</td>
<td>1.67, 3.33</td>
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<tr>
<td>Ketorolac &amp; Bupivacaine</td>
<td>1.19</td>
<td>2.96</td>
<td>2.13, 3.79</td>
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Thus, intraoperative irrigation of Ketorolac combined with Bupivacaine reduced pain in the postoperative period. It did not appear that anesthetologist, anaesthesia time, surgeon, OR time, difference of dissection, breast incision or implant size had a significant impact on postoperative pain. There was a trend that the Ketorolac and Bupivacaine patients spent less time in the recovery room and used fewer analgesics postoperatively than the other groups. There were no hematomas requiring re-operation and no complications.

CONCLUSION: Locally administered, intraoperative Ketorolac and Bupivacaine with epinephrine significantly reduced pain in the postoperative period in women undergoing primary augmentation mammoplasty.

39 RETROSPECTIVE CASE REVIEW OF CAPSULAR CONTRACTURE AFTER TWO-STAGE BREAST RECONSTRUCTION. DOES COLONIZATION OF THE TISSUE EXPANDER POCKET CORRELATE WITH SUBSEQUENT IMPLANT CAPSULAR CONTRACTURE?
S Macalady, P Clugston

This retrospective case series studied 86 patients following two-stage breast reconstruction between the dates of 1997 and 2001. 86 patients and 124 tissue expanders were included in the study. Colonization of the tissue expanders was determined by pathological examination of specimens taken at the time of expantlation. A chart review was used to determine the presence of capsular contracture after the second stage of reconstruction. Patients were grouped according to presence or absence of colonization, and presence or absence of capsular contracture of the permanent prosthesis. Pre-operative irradiation prior to mastectomy was also documented. The incidence of colonization of tissue expanders was 64.6%. Of the 85 tissue expanders inserted immediately, 49.2% were culture positive. Of the 39 delayed specimens, 28.2% were culture positive (p = 0.027). The most frequent organisms cultured were Propionibacterium acnes (49.5%), and Staphylococcus epidermidis (28.3%). Statistical analysis revealed no significant difference between culture positive and culture negative tissue expanders when correlated with capsular contracture of the permanent prosthesis (p = 0.45). No single organism conferred a higher incidence of capsular contracture. Patients who underwent pre-mastectomy irradiation developed capsular contracture in 45.8% of patients, versus 15.1% of patients with no previous irradiation (p = 0.0013). These results suggest that colonization of the tissue expander occurs frequently, skin organisms are the common pathogens, and colonization did not impart a higher incidence of secondary implant capsular contracture in this study population.

40 VISUAL COMPLICATIONS OF PERI OCULAR HEMANGIOMA
BJ Cowan, D McPhalen, R Harrop, W Astle

Periocular hemangioma of childhood can produce changes in the visual axis leading to ptosis, strabismus, and amblyopia or blindness. OBJECTIVE(S): To review our experience with 16 periocular hemangioma patients. To review ocular development in the infant in the context of periocular capillary hemangioma. To identify early clinical warning signs that may precede devastating visual outcomes in the absence of timely management. DESIGN: Retrospective case series in the Vascular Birthmark Clinic at the Alberta Children’s Hospital, Calgary, Alberta.

INTERVENTIONS: Sixteen children with congenital periocular hemangiomas were identified. All children received a comprehensive assessment by plastic surgery and ophthalmology. Resection of the hemangioma was performed in select cases. Timing of resection was guided by changes in the visual axis toward amblyopia. Pt characteristics, lesion location, timing and type of intervention, and effect of treatment on visual development over time was evaluated. Lesions were documented by digital photography.
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OUTCOME MEASURES: Primary: (1) effect of early surgical intervention on preservation of visual axis. Secondary: The effect of the following features on visual outcome: (1) timing of diagnosis and intervention; (2) location of lesion; (3) size of lesion; (4) corneal pressure applied by the lesion; (5) method of intervention.

CONCLUSION: Early identification and treatment of pericellular hemangiomas at risk of causing amblyopia is essential. Early management of these lesions appears critical for preservation of normal vision.

RESULTS OF SURGICAL CORRECTION OF VELOPHARYNGEAL INSUFFICIENCY IN CHILDREN PRESENTING 22Q11 DELETIONS

A Gapnon, N Arsenaull, J Ottenbeymer, I Cauette-Laberge

GOAL: The purpose of this study was to compare the outcome of surgical treatment for velopharyngeal insufficiency (VPI) in patients with and without 22q11 deletions.

MATERIALS AND METHODS: A retrospective chart review of 40 patients with VPI was conducted. Patients were separated into two groups according to whether they presented microdeletions on the 22q11 locus (group I, 20 patients) or no microdeletions (group II, 20 patients). All the patients were evaluated pre-operatively in a standardized fashion. Another evaluation was done a minimum of three months after surgical treatment for VPI. Competency of the velopharyngeal (VP) mechanism was assessed by evidence of audible or visible nasal air emission as well as presence of weak/omitted consonants. Presence of hypernasality and speech intelligibility was also evaluated. A standardized score was given for each category.

RESULTS: Both groups were compared preoperatively: severe VPI was present in both groups (1/20). The hypernasality score was worse in group I (2.4 / 3) than in group II (1.8 / 3) and the global speech intelligibility was also worse in group I (2.4 / 3) than in group II (1.4 / 3). After the surgery, the VPI score improved for both groups: group I (2.0 / 2) and group II (2.6 / 2). The hypernasality score improved but remained worse in group I (0.9 / 3) than in group II (0.3 / 3). The intelligibility score also improved but remained worse in group I (1.4 / 3) than in group II (0.5 / 3).

CONCLUSION: Surgical correction of VPI is useful in children presenting 22q11 deletions. These children present more severe speech anomalies both before and after the surgery when compared to children not presenting the deletion.

CASE PRESENTATION AND LITERATURE REVIEW, ALOPECIA RECONSTRUCTION FOLLOWING SCALP CONGENITAL GIANT PIGMENTED NEVUS EXCISION WITH MONOZYGOTIC TWIN SCALP ISOGRAFT.

J Arneja, A Koshal, GL Myosa

PURPOSE: To illustrate a unique case report of alopecia reconstruction with scalp isograft between monozygotic twin boys.

CASE HISTORY: We present the case of a nine year old, monozygotic twin boy, D.Y., born with a congenital scalp giant pigmented nevus. This lesion was excised at age 14 months with approximately 50% of the scalp and partial left forehead involvement. Following reconstruction with numerous rounds of tissue expansion (hair bearing scalp) & skin grafting (forehead), he had alopecia of the left anterior scalp “hairline” region. As no further expansion options remained, the decision was made to perform scalp isografting from his brother, E.Y. The brothers were deemed identical after genetic testing.

The surgical procedure on a single day consisted of harvesting of donor occipital scalp from E.Y. measuring approximately 14cm by 1cm with primary closure of the scalp defect. The recipient D.Y.’s region of alopecia was excised and subsequently the isograft on the left anterior scalp was inset.

CONCLUSIONS: We present a novel method of scalp reconstruction in monogygotic twins. There was no isograft failure, but some hair follicles were lost and subsequently recovered such that the hair bearing donor scalp was successful in reconstructing the hairline. We acknowledge that this is a rare indication of isograft utilization, but an alternative and adjunct to autologous reconstruction without transplant immunosuppression risks.
CONCLUSIONS: We conclude that ADM is commonly involved in DC of the little finger and that failure to recognize and resect the diseased cord arising from it and its overlying fascia at the time of surgery may account for the poor outcomes seen in DC of the little finger.

46 A NEW INTERNET BASED TOOL FOR EDUCATION IN BREAST RECONSTRUCTION

K Wanzel, M Brown, D Anastakis, G Regehr

INTRODUCTION: Recent investigation by our group concluded that inadequate referring physician knowledge and misinformation were major contributing factors in the referral of potential breast reconstruction candidates to plastic surgeons. Our current goal was to develop a useful tool for education on breast reconstruction that was accessible and informative for both referring physicians and women considering breast reconstruction.

METHODS: A needs-assessment was conducted. This comprised: (i) a survey mailed to 300 general practitioners, 200 general surgeons, 200 oncologists, and 150 plastic surgeons, and (ii) 3 focus groups and 9 individual interviews. Data generated was analyzed and an Internet-based educational tool was developed based on these results.

RESULTS: Survey return rates were 70% (plastic surgeons), 48% (oncologists), 46% (general surgeons), and 28% (general practitioners). Ninety-one percent of oncologists, 90% of general surgeons, and 77% of general practitioners indicated that they would want to be notified when our web site was on-line and the vast majority of these respondents (80%, 78%, and 70%, respectively) indicated that they would definitely use this educational tool. In addition, the usefulness of several web-site attributes were determined, with questions ranging from those regarding various web site design techniques and multimedia presentation strategies to questions designed to elicit information on what specific clinical information would be most beneficial.

CONCLUSIONS: Inadequate knowledge and misinformation can be addressed through continuing education endeavors. Our results demonstrate a usefulness and demand by referring physicians for accessible and accurate information about breast reconstruction. The process of developing the Internet-based educational tool and the final product of our efforts will be demonstrated (www.breastreconstruction.ca).

47 HEALTH UTILITY MEASURE IN SURGICAL LITERATURE

K Chew, A Thoma

INTRODUCTION: Utilities measure the value of a health state and are very relevant to Plastic Surgery. It provides a reliable and valid method to measure the benefit of an intervention.

PURPOSE: To review methodology for measuring health utility in surgical literature and assess the quality of these methods as it relates to guidelines by the Panel of the Cost-Effectiveness in Health and Medicine.

METHODS: A computerized literature search of Medline and HealthStar from 1986–June 2002 was undertaken. Review articles or studies without surgical intervention and a key objective to determine health utility or QALY were excluded. Two reviewers systematically reviewed the search results and selected studies for full appraisal. Information was abstracted on the surgical area, year and country of publication, study type, health utility measurement method, and the perspective.

RESULTS: 73 studies met selection criteria. Most frequently, studies pertained to vascular (16.4%), and orthopedics (13.7%). Only 4 studies (5.5%) were related to plastic surgery. Majority were economic evaluation using decision analysis (38.4%) and Quality-of-life studies (26%). Over half (57.5%) of the studies originated from the United States. Only 3 Canadian studies were found. EuroQol (18%), existing literature (17%), and standard gamble (16%) were the most commonly utilized methods. The majority used the patient perspective (39%), and only 25% chose the community preference as advocated by the Panel. Twenty studies (27%) fully satisfy the guidelines, with literature from vascular and plastic surgery adhering most often.

CONCLUSION: Surgical literature relating to health utility have increased over the years but the majority do not adhere to guidelines recommended. It is encouraging that Plastic surgery literature had the highest number of studies meeting the criteria set out by the Panel.

48 PATIENT SELF-ASSESSMENT OF THE COSMETIC RESULTS OF BREAST RECONSTRUCTION

WN Anandra, JL Semple

INTRODUCTION: This is a retrospective chart review of IDEM patients admitted to a Canadian burn centre (n=15) and a US centre (n=16). The Canadian patients were compared to a group of non-diabetic burn patients matched for age, sex, TBSA, etiology, and time period (n=15). Comparisons were made between Canadian IDEM patients vs controls, Canadian IDEM vs US IDEM, and between Canadian and US IDEM vs controls. Outcome measures included mortality, infection rates, graft-take, and number of operations, healing time, and length of stay (LOS).

RESULTS: LOS in the Canadian diabetics was significantly longer than controls (19.1±16.6 days versus 12.1±7.5). Although not statistically significant, grafting rates were higher in the IDEM group (23% versus 13%) as was mortality (13% versus 0%). Including the US data, we found LOS of IDEM patients significantly higher (14.8±13.7 days versus 12.1±7.5). Grafting rates were also higher for the IDEM group (23% versus 13%). The mortality was lower in the US diabetics (7% versus 13%). This may be related to lower TBSA (8% versus 4%; p=0.028), and younger age (50.2±19.1 years versus 40.6±17.3) of the US diabetics.

CONCLUSIONS: We found diabetic patients have worse outcomes, as indicated by a significant increase in LOS and a trend to higher regrafting and mortality rates.

49 MORBIDITY AND MORTALITY OUTCOMES IN BURN PATIENTS WITH INSULIN-DEPENDENT DIABETES MELLITUS

K Ladding, D Heimbach, N Gilbran, H Shankowsky, S Loguetty

INTRODUCTION: It is a common clinical assumption that burn patients with pre-existing insulin-dependent diabetes mellitus (IDDM) have worse outcomes than non-diabetic counterparts. A literature search (30 years) yielded a paucity of information specific to outcomes of burn patients with IDDM.

PURPOSE: To compare quality of healing in the long term with Integra as compared to normal skin, meshed, or sheet grafts on wounds within the same burn patient. We found diabetic patients have worse outcomes, as indicated by a significant increase in LOS and a trend to higher regrafting and mortality rates.

50 LONG-TERM FOLLOW-UP COMPARING THE QUALITY OF WOUND HEALING USING INTEGRA ARTIFICIAL SKIN COMPARED TO STANDARD TREATMENT AND NORMAL CONTROLS

A Jarman, S Levine, H Shankowsky, E Tredget

INTRODUCTION: Early excision and autografting remain the treatment of choice for deep burns; however, in patients with large burns autografting is not always possible due to limited available donor sites. Integra™ artificial skin was developed as an alternative solution for acute wound coverage and reconstruction.

PURPOSE: To compare quality of healing in the long term with Integra as compared to normal skin, meshed, or sheet grafts on wounds within the same burn patient.

METHODS: 8 of 20 patients who received Integra for more than 3 years underwent assessment using photography and revised Vancouver Burn Scar Score (VBBSS).

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Objective assessments of elasticity were made using the Cutometer® and pigmentation and the using the Mexometer®.

RESULTS: The mean age of the patients (8) was 25.9±4.8 years, TBSA 65.3±10.8% and full-thickness area was 56.8±9.9%. The time to assessment was 44±7.1 months post-injury. Scar rating for Integra (2.19±0.71 vs 0, p=0.05) and meshed grafts (2.83±0.43 vs 0, p<0.05) were significantly less than normal skin or donor site wounds, but not from each other. Meshed grafts were hypopigmented as compared to Integra (46.2±1.9% vs 48.1±7.2, p=0.05). Meshed grafts were significantly less pleasurable than either donor sites (0.86±0.1 vs 0.71±0.05, p=0.05) or normal skin (0.86±0.2 vs 0.99±0.05, p=0.05). Integra was less elastic than normal skin (0.88±0.05 vs 1.02±0.05, p=0.05). There were no differences in erythema in all groups.

CONCLUSIONS: To date, in massive burns both meshed grafts and Integra were less elastic than normal skin and had poorer scar rating as compared to normal skin. Using VBISS and Cutometer, Integra was not significantly better in quality of healing than meshed skin grafts except for hypopigmentation in the meshed skin grafts. In the future, more patients will require analysis with smaller burns where prompt 2nd stage resurfacing of the Integra is performed to determine if Integra will give a better quality of wound healing than skin grafts for reconstruction of the skin.

Acknowledgements: Alberta Heritage Foundation for Medical Research, Canadian Institute for Health Research, and the Firefighters Burn Trust Fund.

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A CONTROLLED, COHORT STUDY COMPARING ALLEVYN™ AND XEROFORM™ WOUND DRESSINGS IN TREATMENT OF PARTIAL-THICKNESS DONOR SITES

J Weiff, H Shankowsky, E Tredget

BACKGROUND: The split-thickness skin graft donor site is often a painful wound that can require weeks to heal. A wound dressing that can both minimize the healing time, and the post-operative pain of the donor site would be a valuable addition to burn care. The purpose of this study is to compare two wound dressings, Allevyn™ and Xeroform™, in the treatment of split-thickness skin graft donor sites.

METHODS: The patient's donor site was divided into two equal areas. Allevyn™ was randomly chosen to cover one area, and Xeroform™ the other. The end-point was the number of post-operative days required for 90% healing of the wound. Each donor area was also monitored for pain, ease of use, and general appearance.

RESULTS: To date 18 patients have been enrolled in the study. The Allevyn™ group required, on average, 9.8 ± 0.6 days for 90% healing, compared to 10.3 ± 0.6 days for the Xeroform™ group (p=0.135). There was also no statistically significant difference in pain between the two groups during their follow-up. For post-operative day 7, the average pain score was 2.8 ± 0.5 and for the Allevyn™ covered donor sites and 3.3 ± 0.7 for the Xeroform™ covered donor sites (p=0.36).

CONCLUSIONS: Allevyn™ and Xeroform™ are effective dressings choices for the treatment of split-thickness skin graft donor sites. However, there is a trend for both decreased healing time and pain in donor sites covered with the Allevyn™ dressing. Acknowledgements: Alberta Heritage Foundation for Medical Research, Smith & Nephew.

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IN VITRO MODEL OF ADULT HUMAN RECTUS ABDOMINIS (RA) SKELETAL MUSCLE: DEVELOPMENT AND CHARACTERIZATION

CAE O'Brien, N. Huang, BY Pang, PC Neligan, JE Lipa

The use of free muscle flaps in reconstructive surgery has led to improved options for diverse problems including tissue coverage, limb salvage and facial re-animation. However, free flaps can be complicated by ischemic necrosis resulting in deformity and requiring further surgical intervention. Strategies aimed at prevention of this complication have been investigated using animal models. To date, there is no existing human skeletal muscle model available to study the pathophysiology and pharmacology of ischemia/reperfusion injury or ischemic preconditioning. We have developed an in vitro model of adult human rectus abdominis (RA) muscle that is physiologically stable to 24 hours in culture after an initial 30-minute equilibration period. RA muscle slices were maintained in culture at consistent pH (7.4) and pO2 (350 to 450 mmHg). After an initial decrease in ATP production during the 30-minute equilibration period, ATP levels remained stable to 24 hours in culture. Mitochondrial function, as indicated by conversion of MTT to a blue formazan product by viable mitochondria, similarly remained stable to 24 hours in culture. Lactate levels in the culture media gradually increased with time in culture, however, lactate production per hour remained stable after 1 hour in culture until 24 hours. This model will facilitate investigation of the pathophysiology of ischemia/reperfusion injury and the efficacy of ischemic preconditioning in human skeletal muscle, which may have significant implications for reconstructive surgery.

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THE EFFECTS OF METHACRYLIC ACID CONTAINING BEADS ON ANGIogenesis IN A RODENT SKIN AND COMPOSITE MYOCUTANEOUS GRAFT MODEL

AA Eckhaus, M Selvton, GA Skarja, MB Gorbet, JF Fish

INTRODUCTION: Skin graft “take” is dependent on neovascularization and was thought to be an excellent model to assay “functional” angiogenesis.

HYPOTHESIS: MAA beads induce angiogenesis leading to increased graft survival. Polymethylmethacrylate (PMMA) beads do not have a similar effect and serve as a biocompatible control.

METHOD: Twenty-four male Wistar rats had two contralateral dorsal grafts harvested and autografted (2 × 3 cm). The left side was a composite myocutaneous graft (full thickness skin, and panniculus carnosus muscle) and the right side was a full thickness skin graft. Group 1 (n=8) had MAA beads placed on the recipient bed. Group 2 (n=8) had PMMA beads placed on the recipient bed. Group 3 (n=8) had no intervention. Fluorescein perfusion assays were performed on days 5, 7, and 26 on two animals per group. On days 3, 5, 7, and 26 two animals per group were sacrificed for histology.

RESULTS: At day 7, the skin grafts treated with MAA beads had increased fluorescein perfusion over PMMA treated and control grafts (p<0.05). At day 26, the myocutaneous grafts treated with MAA beads had increased fluorescein perfusion over PMMA treated and control grafts (p<0.01). There was no difference in perfusion between PMMA treated and control grafts at any time point. Data for blood vessel counts using Factor VIII staining will be presented.

CONCLUSIONS: Increased perfusion is indicative of increased graft revascularization and tissue survival. MAA beads increased skin graft perfusion at day 7, as well as composite myocutaneous graft perfusion at day 26.

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REsIDUAL BREAST DEFORMITY AFTER BREAST CONSERVING MASTECTOMIES

M Al-Taqi

Breast conserving surgery is now established as a mainstay of treatment for early breast cancer. Breast conserving surgery can give poor cosmetic results. We have carried out a retrospective clinical study on patients treated by breast conserving mastectomy from January 2001 to January 2003 at McGill University. The degree of deformity and the need for reconstruction were evaluated. Risk factors associated with breast deformity were studied.

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FRONTAL SINUS FRACTURE OUTCOMES: A TEN-YEAR FOLLOW-UP STUDY

AD Armour, J Mainprize, O Antonsyn

INTRODUCTION: FrONTAL sinus fractures can result in significant morbidity in both the short and long term. Although surgical management has evolved to specifically address each fracture type, our effectiveness as plastic surgeons at preventing long-term complications has proven difficult to demonstrate in a large series.

OBJECTIVE: The main objective of this study was to assess outcomes of frontal sinus fracture primary repair. The specific outcomes evaluated were infection, forehead and temple contour and forehead pain.

METHODS: Patients were identified through our institution's Trauma Registry, as well as our Plastic Surgery billing records. Patients were contacted by letter and by phone. A total of 56 frontal sinus fractures were treated one of three plastic surgeons from January 1991 to 2001. Eight patients could not be contacted. The remaining 48 patients were interviewed according to a standard questionnaire, by telephone or in person. A Cyberware three-dimensional scan allowed contour measurements on twenty patients.

RESULTS: The follow-up rate after one year was 86%, with a mean follow-up of 33 months ± 30.7 SD. Forty-four patients fractured the anterior and posterior tables. The nasofrontal duct was noted to be involved in 15 patients. A CSF leak was diagnosed in 15 patients. Our rate of infectious complications was 9%, with 4 out of
INTRODUCTION: Little is known about strain patterns in the human craniofacial skeleton, which are important for the development of bone substitutes, refining fracture plating techniques, and understanding craniofacial development. We have developed a model to measure the strains experienced by the facial skeleton.

METHODS: A human cadaveric skull was skeletonized, leaving intact the origins and insertions of several masticatory and mimetic muscles. Forty-six strain gauges were distributed over the left side of the skull. Cable was sutured to both the origin and insertion of temporalis muscle. The skull was mounted on a hydraulic testing machine and positioned with the axis of pull coincident with the anatomic axis of the muscle being tested. Tension was applied to the origin and then insertion of the temporalis muscle via the cables up to 120 Newtons while strain was measured at all strain gauge sites.

RESULTS: There were distinct patterns of strain in the sites tested. The squamous portion of the temporal bone had stress shielding during tension on the temporalis origin, with strain concentrated anteriorly in the lateral orbital rim and posteriorly in the temporal bone above the mastoid. Strain vectors and magnitudes for the sites tested will be presented and graphically illustrated.

CONCLUSIONS: The strain patterns in the craniofacial skeleton are not predictable based solely on morphology. The temporal fossa has stress shielding through an arch along its superior margin, which suggests that some basic mechanical constructs exist in the craniofacial skeleton that counter physiologic loading.

INTRODUCTION: The Mentor Contour Profile Tissue expander is a biodimensional, integrated valve, textured device. It has been available for several years, but minimal data exists regarding its clinical effectiveness. We reviewed our experience with the Mentor Contour Profile Tissue expander in breast reconstruction. This expander is a biodimensional, integrated valve, textured device. It has been available for several years, but minimal data exists regarding its clinical effectiveness.

A chart review of consecutive breast reconstruction patients using Contour Profiles between April 2001 and February 2003 was done (study is ongoing). Indications for use, technique, rate and type of complications, and aesthetic results were analyzed. Thirty-nine Contour Profile tissue expanders were inserted into 31 patients. All results listed are averages. The intra-operative expansion volume was 127cc, with a final expanded volume of 442cc. Full expansion needed 4.9 sessions over an 8-week period. The time between placement of the expander and exchange of the expander for a permanent prosthesis was 5.75 months. The final implant size was 345cc. In all cases but one, a biodimensional cohesive silicone gel implant was used in the 2nd reconstructive stage.

The operative time for the second reconstructive stage was 52 minutes. This included bilateral cases, cases where balancing procedures were done contralaterally, and cases of simultaneous nipple-areola reconstruction. There were 4 complications out of 39 expanders for a rate of 10% including 1 seroma, 2 infections, and 1 malpositioned expander. Only the infections changed the reconstructive plan, for an adjusted complication rate of 2/39 (5%) requiring reoperation.

Thirty-nine breasts were successfully reconstructed using the Contour Profile tissue expander. We found these devices to be safe, easy to use, and to produce excellent aesthetic results.

INTRODUCTION: A number of studies have shown positive outcomes in patients after reduction mammoplasty; however, there has been little published regarding Canadian patient populations. With increased scrutiny of health care spending the necessity of demonstrating benefits to patients after surgical interventions is growing.

OBJECTIVE: The goal of this study was to prospectively assess outcomes in women undergoing reduction mammoplasty in Nova Scotia.

METHODS: 50 patients were evaluated preoperatively and six months postoperatively with the Short Form 36 Health Survey (SF-36), a Symptom Inventory Questionnaire and the Rosenberg Self-Esteem Scale. Data describing patient demographics, preoperative patient evaluations, operative technique and postoperative course was also collected. Preoperative and postoperative health status was compared, and SF-36 scores before and after surgery were compared to Canadian population norms.

RESULTS: Comparison of preoperative and postoperative health status showed significant improvements in seven out of eight health domains and in the physical summary scale of the SF-36 (p<0.01). Significant improvements were also seen in the Rosenberg Self-Esteem Scale (p<0.01) and in all breast related symptoms assessed by the Symptom Inventory Questionnaire (p<0.01). When compared to the normal female population, preoperative SF-36 scores were significantly worse in the physical functioning, bodily pain and energy/vitality domains, as well as on the physical summary scale (p<0.002). Postoperative scores were the same or better than the normal population in all areas measured by the SF-36.

CONCLUSION: This study determined that there were significant health benefits in women undergoing reduction mammoplasty.

INTRODUCTION: Breast reconstruction following mastectomy is associated with psychological and functional benefits. Although evidence from other provinces suggests that rates of breast reconstruction are low, the rate in Nova Scotia has yet to be established. Little is known about the factors that determine who opts for breast reconstruction, nor which reconstructive options are most commonly chosen. The objectives of this study are to (1) determine the rate of breast reconstruction in Nova Scotia and describe the trend over time, (2) identify patient and physician characteristics which influence access to breast reconstruction and (3) describe the changing rates of different reconstructive options.

This study employed a retrospective cohort design. The cohort consisted of all women diagnosed with breast cancer who have undergone mastectomies in Nova Scotia since 1991. Subjects were followed until 2001 and data was gathered from the Medical Services Insurance (MSI), Canadian Institute for Health Information (CIHI), and Discharge Abstract Databases (DAD). The cohort was linked to the Physician Demographics and Vital Statistics Databases to determine physician and patient factors associated with having breast reconstruction. Analysis was performed in one-year increments to facilitate trend identification.

A total of 3979 women had mastectomies during the study period, with 404 (10.15%) undergoing reconstruction. The most common methods of reconstruction during the last half of the study period were pedicled TRAM flaps (35.1%), implants (23.6%) and latissimus flaps (16.2%). Fifty (12.4%) of the reconstructions were immediate. Immediate reconstructions were more common during the later years. Further analysis will be presented.

INTRODUCTION: Tuberous breast deformity is a congenital anomaly of breast development occurring in pubertal females. Severe tuberous deformity presents with the classical features of a constricted breast base, enlarged areola, breast herniation through the nipple areola complex, inferior pole skin deficiency and an elevated inframammary fold. Although the literature is replete with various approaches to this complex surgical dilemma, no technique has adequately addressed the severe breast constriction often associated with this deformity. We propose a technique that addresses all of the characteristic features of severe tuberous breast deformity and achieves excellent aesthetic result.

METHODS: Two patients with Type III (modified from Weinberg classification) severe breast constriction tuberous breast deformity were treated in a two-stage pro-
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**61 INVESTIGATION OF THE EFFECTS OF SINGLE DOSE ORTHOVOLTAGE RADIATION ON OSTEOPHABST FUNCTION IN VITRO WITH AND WITHOUT CYTOPROTECTION**

**AM Gevorgyan, GC La Scala, B Sukhu, IT Leong, H Ashrafpoory, CY Pang, PC Neligan, CR Forrest**

We have previously demonstrated the effectiveness of cytoprotection (Amifostine, WR 2721) in the prevention of radiation-induced craniofacial bone growth inhibition using an infant rabbit orbito-zygomatic complex (OZC) model following single and fractionated dose orthovoltage radiation. The aim of this study is to assess the effects of single dose orthovoltage radiation (SDOR) on osteoblast function in vitro with and without cytoprotection in order to elucidate the mechanisms of radiation-induced craniofacial bone growth inhibition using the rabbit OZC periosteal-derived osteoblast cell culture model established by our lab. Male 7-week old New Zealand white rabbits randomized into 3 groups received SDOR of 0 Gy, 10 Gy and 15 Gy with and without Amifostine pre-treatment (0 and 200 mg/kg IP; 20 min prior to radiation). 12 hours post-radiation, the periosteum of the OZC were harvested and osteoblast cell cultures developed. The cultures were analyzed for alkaline phosphatase (AP) activity, type I collagen production, mineralization, and cell counts at subculture. Osteoblast cell counts at subculture, proliferation, mineralization, AP activity and type I collagen production were significantly (p<0.05) inhibited at SDOR at 15 Gy, whereas there was no significant difference at 10 Gy. Data on Amifostine effects in attenuation of radiation-induced craniofacial bone growth inhibition are pending. The results of our study suggest that SDOR at 15 Gy has detrimental effects on osteoblast function in vitro in our model. It is expected that this project will shed light upon the mechanisms of cytoprotection in the prevention of radiation induced craniofacial bone growth inhibition.

**62 THE IDENTIFICATION AND QUANTIFICATION OF CUTANEOUS FIBROCYTES IN BURN PATIENTS**

**EE Tredget, L Yang, J Giuffre, H Shankowski, P Scott**

**INTRODUCTION:** Peripheral blood fibrocytes (PBMC) are a newly identified leukocyte subpopulation that display fibroblast-like properties and are antigen-presenting cells that activate T lymphocytes. Fibrocytes enter an injury site, similar to inflammatory cells and participate in wound healing. We hypothesize fibrocyte differentiation is regulated by wound healing growth factors; there is a positive correlation between circulating and/or local fibrocyte numbers and burn injury.

**METHODS:** PBMC from 18 burn patients and 12 controls were cultured for 14 days. Percent of fibrocytes cultured from PBMC was determined by fluorescence staining for type I collagen and flow cytometry. To determine a specific marker for fibrocyte identification in tissue, two-dimensional gel analysis, protein sequence and Western blot were performed on proteins from cultured fibrocytes, lymphocytes and fibroblasts. The number and location of tissue fibrocytes was determined by immunohistochemistry and flow cytometry.

**RESULTS:** Percent of fibrocytes differentiated from PBMC was higher for patients with a 25% TBSA burn than for controls (89.7±7.9% vs 69.9±14.7%, p<0.001); the highest percentage appeared 3 weeks after injury. A positive correlation was found between serum TGF-β1 levels and percentage of fibrocytes developing in culture. Cell culture treatment with TGF-β1 enhanced development of collagen-positive cells, whereas adding neutralizing anti-TGF-β1 antibody suppressed fibrocyte differentiation. A lymphocyte specific protein (LSP) marker was detected in fibrocytes. Western blot showed LSP expression was higher in fibrocytes than lymphocytes from the same patient. The presence of LSP positive fibroblast-like cells in normal and hypertrophic scar (HSc) tissue was confirmed by immunohistochemistry. The number of LSP positive cells was higher in HSc than in normal tissue. The percentage of fibrocytes among skin cells isolated from biopsy specimens was determined by dual labeling with antibodies to CD11b and CD16/Terminal proadipoyte of type I collagen and flow cytometry.

**CONCLUSIONS:** The data suggests the development of fibrocytes is upregulated systemically and locally following burn injury. Increased TGF-β in serum stimulates the differentiation of fibrocyte precursor cells into collagen producing cells. Increased local fibrocytes may up-regulate the inflammatory response and accelerate the healing rate, thus contributing to HSc.

**Acknowledgements:** Canadian Institute of Health Research, Alberta Heritage Foundation for Medical Research, Firefighters’ Burn Trust Fund

**63 USE OF TRANSCYTE™ IN THE TREATMENT OF PARTIAL THICKNESS BURNS AT TWO CANADIAN TERTIARY MEDICAL CENTRES**

**FC Lam, WG Cannon, H Shankowski, L Budd, TE Tredget, JC Boyle**

TransCyte™ is a biological wound dressing used to treat patients with partial thickness burn injuries.

**METHODS:** Retrospective and prospective data (July 1999-August 2002) was obtained from two tertiary Canadian medical centres. End-point was successful epithelialization or need for skin grafting.

**RESULTS:** Six adult and seven children were treated with TransCyte to one area and either silver sulfadiazine, Flamazine C, polysporin, Exudry, or Acticoat to remaining areas. Hot liquid burns comprised 69.2% of all 13 cases and flame burns 30.8%. Of seven children treated, 5 were <12years old; mean age was 4.8 ± 4.3 years. Mean %TBSA was 12.1 ± 4.2%. Five suffered partial thickness burns with areas of indeterminate depth from hot liquids and 2 partial thickness burns due to flame. Two hot liquid burns and one flame burn went to healing with TransCyte; 4 cases required skin grafts. Mean hospital stay was 12.8 ± 7.9 days; no children died. Mean age of adults was 43.1 ± 15.8 years; mean %TBSA was 26.5 ± 22.8% (4 had hot liquid burns, 2 flame burns). Three with hot liquid burns healed with TransCyte; 3 required skin grafts. Mean hospital stay was 21.1 ± 14.3 days; one patient died from sepsis.

**CONCLUSIONS:** TransCyte was successful in producing epithelialization in 38% of cases that may have otherwise needed skin grafts. In all patients, conventional burn treatments did not lead to healing and all required skin grafts. This study is the first to describe TransCyte use in two tertiary Canadian medical centres.

**64 PROBLEMS ENCOUNTERED USING TISSUE EXPANSION IN BURN RECONSTRUCTION**

**CFI Smelling, B Malpass, J Boyle**

Tissue expansion has broadened the choices available for post burn reconstruction; however, unique problems may adversely affect the aesthetic result.

**METHODOLOGY:** Sixteen patients managed by a single surgeon with at least 12-month follow-up were evaluated. Expanders were placed via an incision along the leading edge of the planned tissue advancement. Photographs, operating reports, follow-up notes, and recent re-examination by an independent surgeon were reviewed.

**RESULTS:** The series consists of six scalp, seven cheek/chin, and three trunk expander reconstructions. Four of the six scalp reconstruction patients underwent expansion to restore frontal and temporal hairlines. Complications noted in this group included a S. aureus infection in a patient whose expander was inserted 3-months post-burn leading to expansion delays. Two expansions were insufficient to restore both anterior and temporal hairline. The two other scalp reconstructions had
Microscopic findings after six minutes laser exposure without the use of tumescent exposure (Zero minutes). Laser penetration through adipose tissue decreased when beam for 4, and 6 minutes was performed and compared with samples without laser.

3. Without the use of tumescent solution, in vitro exposure of adipose tissue to laser structures such as the capillaries and the remaining interstitial space, were however evidence that fat was outside the adipose cells, and remained in the interstitial space. Membrane pores were observed in the cell membrane. There was found microscopic partial disruption of the adipose cell was observed; several cells without disruption of fat samples were processed as follows:

65 CLINICAL AND ECONOMIC IMPACT OF ONE STAGE PROFILE-PLASTY. A 15 YEAR PERSPECTIVE
A Nikola, Y Fitiicugliu, A Moreira-Gonzales, IT Jackson

INTRODUCTION: Numerous authors support staged correction of nasal and maxillary/mandibular deformities, while others advocate a one-stage procedure in which all elements are corrected during the same operative setting.

MATERIALS AND METHODS: Between 1988 and 2002, 104 non-syndromic and non-cleft patients who have undergone one stage profile-plasty were evaluated. Data was abstracted from hospital charts, questionnaire, and telephone interview. Patients were assessed for clinical parameters, including type and number of subsequent operations, length of procedure, blood loss, hospital stay, intra- and post-operative complications, medication administration, and patient satisfaction. A cost analysis was utilized in comparing this group with controls who underwent two-staged procedure.

Trends over a 15 year period were analyzed.

RESULTS: A significant reduction in the length of hospital stay and operative procedure has been demonstrated following one stage correction. Steroid and prophylactic antibiotic administration were not associated with a lower complication rate. Excluding surgeon’s fees, analysis of costs associated with one-stage vs. two stage procedures demonstrates a cost savings of approximately twenty-five percent to the patient/insurance carrier. Furthermore, subjective and objective measures of patient satisfaction (telephone interview, questionnaire and clinical panel opinion) were uniformly high on follow-up.

CONCLUSION: One stage profile-plasty can be accomplished safely and efficiently with meticulous pre-operative planning. High patient satisfaction and substantial economic benefits make this procedure worthwhile in the hands of the experienced surgeon.

66 LOW LEVEL LASER ASSISTED LIPOPLASTY: A NEW TECHNIQUE
R Neira, JA Arroyabe, E Solarte, H Ramirez, O Gutierrez, C Isaza, W Criollo, Cl Ortiz, GC Quimico, LE Zapata, MI Gutierrez

This study describes the scientific basis for a new lipoplasty technique based on the use of a low-energy laser diode beam. A multidisciplinary team studied fat samples randomly taken from fifteen patients that underwent a liposcultpure procedure. Transmission Electron Microscopy, Scanning Electron Microscopy, Magnetic Resonance Imaging, and High-Resolution Harmonic ultrasound studies as well as in vitro studies were performed in order to clarify the laser effects on the adipose cells. Finally optical transmittance studies were realized to establish a physical correlation between in vitro irradiated adipose cells and laser irradiation time.

Fat samples were processed as follows:

1. Application of tumescent technique and exposure to laser beam for 4 minutes. Partial disruption of the adipose cell was observed; several cells without disruption of the cellular membrane were preserved. The adipose cells lost their round shape, and fat spread into the intercellular space.

2. Application of tumescent technique and exposure to laser beam for 6 minutes. Membrane pores were observed in the cell membrane. There was found microscopic evidence that fat was outside the adipose cells, and remained in the interstitial space. Structures such as the capillaries and the remaining interstitial space, were however preserved.

3. Without the use of tumescent solution, in vitro exposure of adipose tissue to laser beam for 4, and 6 minutes was performed and compared with samples without laser exposure (Zero minutes). Laser penetration through adipose tissue decreased when the tumescent solution was not utilized. The Scanning and Transmission Electron Microscopic findings after six minutes laser exposure without the use of tumescent solution correspond to those observed at 4 min. laser exposure by equal intensity (10 mW) combined with the use of a tumescent solution, suggesting that the application of the tumescent solution is a important enhancement factor. The effect of this new technique can be summarized as follows:

1. Facilitates fat extraction since the fat comes out liquefied.
2. Reduces surgical trauma.
3. Reduces post-surgical edemas formation since it reduces surgical trauma.
4. Less post surgical edema is seen.
5. Patients present just minimum post-surgical pain
6. Patients return to normal activities at 72 hours.
7. Satisfactory silhouet contour can be acquired.
8. Skin retraction is seen over time and follow up.

Aesthetic results in the 800 patients that have been follow-up to now were particularly satisfactory; skin retraction, silhouet contour were also satisfactory besides smoother skin surface can be obtained. The laser technique (LAL, technique) could considered an efficient tool during liposuction procedures and this might be a new focus in the plastic surgery field. Adipocyte cultures confirmed what is happening with the adipose cell after irradiating it with the laser beam. These cells remain alive despite the membrane deformation generated by the exposure to the laser beam for 6 minutes. After irradiating the cells the adipose culture cells recover the original round shape after 72 hours. This findings confirm the viability of the adipose tissue exposed to the laser beam, and for this reason this tissue can be used appropriately for fat grafting.

The laser liposculpture (LAL, technique) is then, a new method to keep in mind that gives the plastic surgeon a pleasant tool in surgery and gives the patients satisfactory aesthetic results. This is a research study that is now in process and is undergoing clinical evaluation and quantification.
Abstracts

for
1. single stage alloplastic cranioplasties
2. facial contour deformities and osseous graft modelling
3. autogenous ear reconstruction treatment planning and intraoperative ear carving templates
4. osseointegrated ear prosthetic planning and construction
As this technology becomes more freely available, plastic surgeons will be able to apply it to their own field of interest. Our patient outcomes will continue to improve as we can more exactly plan and carry out our surgical interventions.

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NASAL RECONSTRUCTION IN JOHANSON-BLIZZARD SYNDROME
N Timoney, MJ Weinberg, D Ross, HG Thomson
This syndrome comprises many complex medical and surgical problems. Those affected have a characteristic beak like appearance of the nose due to absence or hypoplasia of the nasal alae. Plastic surgeons tend to be consulted early in the child's life and are faced with a challenging reconstructive problem.

Two cases that reveal the spectrum of facial deformity, and the challenges of major nasal reconstruction in young children of this kind are presented.

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HIND QUARTER COMPOSITE TISSUE ISOTRANSPLANTATION IN A CASE OF CONJOINED TWINS
RJ Redett, R Zuker, N Timoney
Composite tissue transplantation has been used in the upper extremity with encouraging results. We present a case of hindquarter transplantation in a pair of ischiopagus (united ventrolaterally with a shared lower thorax, abdomen and large conjoined pelvis) conjoined twins separated at three months of age. Each twin had one functionally and normally active leg and a shared, nonfunctional leg. Due to acute decompensation secondary to a lethal and unrepairable cardiac anomaly in one of the twins, plans for tissue expansion and delayed separation were aborted. Instead, the fully functional leg and entire hindquarter from the dying twin was transplanted to the surviving sister. The pelvic bones were revascularized and reinnervated to the healthy twin. Because conjoined twins are syngeneic, no immunosuppressive therapy is required.

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INDUSTRIAL PSYCHOLOGY AND THE SELECTION OF RESIDENTS
PJ Warren
Industrial psychologists have long been used in the business world to assess applicants for important corporate positions. Up to one hundred personality characteristics and psychological traits can be investigated and quantified. A pilot project at the University of British Columbia has been employed for three years using this approach in the assessment of resident applicants, prior to the CARMIS match. This has led to increased objectivity and reproducibility of the process. Our initial experience with this modality will be presented.

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USE OF ACADEMIC COURSEWARE WEB-BASED APPLICATION FOR DISTRIBUTION OF PLASTIC SURGERY EDUCATIONAL MATERIALS
PW Bray
INTRODUCTION: The main didactic component of our residency program consists of a rotating 3-year seminar series covering all topics relevant to plastic surgery. Dissemination of seminars and other educational materials either by hard-copy or email has been cumbersome. Computer applications that facilitate academic course delivery, known as Courseware, are becoming popular for administration of formal post-secondary teaching and offer a potential solution to this problem.

PURPOSE: To determine effectiveness of an academic courseware application for collection and distribution of plastic surgery educational materials

METHODS: The courseware application Blackboard (Blackboard, Inc.), licensed for use by University faculty and students satisfied our pre-determined requirements:

- Web-based access
- Password protected interface
- Simple configuration and document management

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- Web-based access
- Password protected interface
- Simple configuration and document management

Over 6 month period Blackboard served as sole means of collection and distribution of resident seminars. Documents uploaded included 27 new seminars and 50 from previous years. Access to documents was 100% both by-user and by-document. Advantages noted by users were significant time savings due to elimination of need for creation and distribution of hard copies and ability to access content from any internet-connected computer.

DISCUSSION: Although designed for more traditional education courses the Blackboard application has proven adaptable, reliable and effective for administration of plastic surgery educational materials.

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HOW LONG DOES IT TAKE PHENTOLAMINE TO REVERSE ADRENALINE-INDUCED VASOCONSTRICTION IN THE FINGER AND HAND? A PROSPECTIVE RANDOMIZED BLINDED STUDY: THE DALHOUISIE PROJECT EXPERIMENTAL PHASE
T Nodwell, DH Lalonde
At the occasion of the Dalhousie Plastic Surgery Alumni Reunion at the Atlantic Plastic Surgery meeting in Halifax in Sept of 2001, twenty two subjects, including 18 certified hand surgeons, were injected with 1.8cc of 2% lidocaine with 1:100,000 adrenaline in three places in one finger of each hand. One hour later, the same sites of one hand were injected with phentolamine (1mg in 1cc), and the other hand was injected with saline. Subjects were blinded as to which hand received the phentolamine. It took and average of one hour and twenty-five minutes for adrenaline injected fingers to return to normal color after phentolamine injection. It took and average of five hours and twenty minutes for phentolamine injected fingers to return to normal color after saline injection (no phentolamine). We also observed that lidocaine with adrenaline provided an average of 9 hours and 9 minutes of anaesthesia in non-phentolamine injected fingers. Phentolamine consistently and reliably reversed adrenaline-induced vasoconstriction in the finger.

Figure 1: Each hand was injected in 3 sites with 1.8cc of 2% lidocaine with 1:100,000 adrenaline. One hour later each 3 sites of one hand were injected with 1mg (1cc) of phentolamine, and the other hand 3 sites received 1cc of saline.

One hour later each subject had the same three places re-injected in both hands. This time the right and left hands were randomized to receive 3 injections of Phentolamine 1cc of 1mg/cc (Sablex, Canada) in one hand, and 3 injections of 1ml of normal saline in the other hand. Subjects were blinded as to which hand received the phenolamine and which hand received the saline. Thus participants acted as their own blinded controls.

74
POST-TRAUMATIC LIMB SALVAGE UTILIZING IPSILATERAL BIVALVED FIBULAR FLAPS
W Del Haas, J Dawes, R Buckley
Severe lower limb trauma is a difficult problem, often requiring below-knee amputation. Free vascularized bone flaps with or without the use of adjuvant autograft, allo-graft or bone substitute materials are indicated for the repair of tribial defects larger than 6-8 cm. In some instances, bivalved pedicle fibular flaps with an exposed
medullary blood supply represent an additional option for the treatment of difficult non-unions and may be particularly effective when used with additional osteoinductive materials such as bone morphogenic protein. The concomitant use of bone substitute materials may reduce donor site morbidity and health care costs. Two illustrative case reports are presented.

75 WHY DO FREE FLAP VESSELS THROMBOSE? THE CAUSE IN NINE FREE FLAPS IN WHICH FLOW HAD STOPPED, BUT HAD NOT YET THROMBOSED
IC Williams, RJ French, DH Lalonde
We reviewed 43 free flaps in 40 consecutive patients (1999-2002) in which the implantable venous Doppler was used to listen to recipient vein outflow after vascular anastomosis. The Doppler allowed us to detect cessation of blood flow in the recipient vein before vascular thrombosis occurred in 9 of the free flaps. All of the cases were re-explored and examined directly for the cause of the cessation of flow that would have ultimately led to thrombosis. In 5 of the cases, the cause was a kink in the vein. Re-positioning the vein to get rid of the kink salvaged all 5 flaps. In 2 cases, the cause was low flow in the flap at the time the vessels clamps were left in. In spite of patent anastomoses, these flaps were lost because there was not enough flow to sustain them. One case was found to have compression of the vein after inserting which was successfully corrected, and the final lost signal was attributable to arterial vasospasm. Of these 9 cases, none had a loss of flow because of technical anastomotic errors. Through these pre-thrombotic conditions that we detected with the implantable venous Doppler, we have begun to understand why vascular thrombosis may ultimately occur.

76 CARPAL TUNNEL SYNDROME: FAILURES IN CONSERVATIVE MANAGEMENT AND SUBSEQUENT SURGICAL OUTCOMES
K Boyd, JC MacDermid, BS Gan, DC Ross, RS Richards, JH Roth
This study investigated the relationship between the severity of symptoms of carpal tunnel syndrome and the success of treatment, including the progression to surgery, in people who had completed a three-month trial of conservative management. Patients involved in a randomized control trial investigating conservative management of CTS were assessed at baseline, 6 weeks, 12 weeks, during the trial and re-evaluated more than one year later to determine final outcomes. Outcome measures included self-report and physical measures. Of the 47 hands that completed the original study, 27 had a subsequent carpal tunnel release performed and were reviewed at a minimum of six weeks following surgery. All self-report measures demonstrated higher severity of symptoms and disability in the patients who went on to have surgery and low response to conservative management. After surgery, a statistically significant improvement in Symptom Severity Score, Levine Functional Score, and the DASH. This study illustrates differences in perceived symptoms between patients who remain on conservative management and those that require carpal tunnel release. It also reveals the effectiveness of surgery in reducing symptom severity. These results suggest that the CTS Symptom Severity Scale may be useful in establishing prognosis and/or establishing priority on surgical wait-lists.

77 THE ROLE OF PERI-OPERATIVE COMPUTED TOMOGRAPHY IN PATIENTS WITH NON-SYNDROMIC CRANIOSYNOSTOSIS
BP Rechner, CR Forrest, JH Phillips, JT Rutka, JM Drake, PB Dirks, RP Humphries
INTRODUCTION: Routine use of peri-operative computed tomography (CT) in the management of patients with non-syndromic craniosynostosis provides the advantages of diagnostic confirmation, and visualization of bony architecture and underlying brain anomalies. However these studies incur additional expense and risk to the infant due to radiation and sedation. The purpose of this study is to assess how CT scans after the management of non-syndromic craniosynostosis patients. The benefits attained from these scans were then weighed against the risks they incurred.
METHODS: A retrospective chart review was performed of all patients with non-syndromic craniosynostosis seen between 1999-2002 at the Hospital for Sick Children Centre for Craniofacial Care and Research. In all patients CT scans had been performed pre and post-operatively to assess cranial architecture. Patients with additional abnormalities were identified and their subsequent clinical courses reviewed.

RESULTS: The cases of 93 patients with non-syndromic craniosynostosis (40 unicoronal, 37 sagittal, 12 metopic, 3 bicoronal, and 1 lambdoid) were reviewed. These patients consisted of 39 females and 54 males ranging in age from 3 to 69 months. CT scans demonstrated multiple additional abnormalities. Pre-operative CT findings varied, including cysts, bony spicules and enlarged ventricles. Early post-operative CT scans revealed occult hematomas and other fluid collections. Late post-operative CT scans identified findings consistent with infection.

CONCLUSIONS: CT scans are invaluable in managing patients with non-syndromic craniosynostosis. The benefits these studies provide far outweigh their risks.

78 A VOLUMETRIC ANALYSIS OF ORBITAL EXPANSION IN GRAVES EXOPHTHALMOS
R Grover, O Antonyshyn
Graves ophthalmopathy is a chronic autoimmune process resulting in an infiltrative fibroblastic reaction involving the periorbital soft tissues. Clinical features include proptosis, lid retraction, and ocular motility disorders. In severe cases, the different aspects of Graves' ophthalmopathy are addressed by surgical decompression of the orbit. However, the degree of orbital expansion required to produce a desired reduction of ocular proptosis is not known. Previous volumetric studies in normal orbits have demonstrated a consistent and predictable relationship, where each 1 ml incremental increase in orbital volume results in a 1 mm retrodisplacement of the globe. The objective of this study is to determine whether this same relationship applies to orbital expansion in Graves ophthalmopathy. The series consists of 3 patients with severe exophthalmos characterized by Wemmer's exophthalmos grades of III or greater and Heretl exophthalmometer readings of >20mm. All patients underwent orbitocystographic osteotomy and advancement, in addition to 3-wall orbital decompression and release of peri-orbita. Preoperative and 3 month postoperative CT scan images were obtained on all patients. Volumetric analysis was performed on an NT workstation using Mimics© Software (Materialise©, Ann Arbor, MI). Pre- and post-operative globe projection was analyzed in relation to changes in the volumes of the orbital cavity and intraorbital soft tissues.

79 CUSTOM RESORBABLE MESH IMPLANT DESIGN FOR FACIAL ASYMMETRY CORRECTION
O Antonyshyn, G Edwards, J Mainprize
Facial asymmetry correction is normally performed by augmentation of the deficient facial skeleton using autogenous bone graft, or bone substitutes. The volume, shape and positioning of the implant, and the adequacy of asymmetry correction, are determined empirically, based on intraoperative observation and the surgeon's aesthetic judgement. This paper describes the development and clinical implementation of a technique for the design of patient-specific resorbable mesh implants in the correction of facial skeletal asymmetry. A previously validated computer assisted technique for quantitative analysis of facial asymmetry (O'Grady, KF, Antonyshyn O, Plast Reconstr Surg 104 (928-937) 1999) is employed in quantitatively describing facial skeletal asymmetry, based on 3D CT image data. A 3D model representing the precise volume of difference between the two facial sides is generated and exported to a Rapid Prototyping system for CAD preparation and tooling. Magic tooling software (Materialise NV, Leuven, Belgium) and a ZA02 3D Printer (Z Corporation, Burlington, MA) are used in constructing 3D physical prototypes. These serve as intraoperative molds for resorbable mesh implant contouring. Facial asymmetry correction is performed precisely according to established routines for facial augmentation. A custom molded resorbable PLLA mesh is used to fix the autogenous bone or bone substitute to the facial skeleton, and to ensure that the contour, volume and anatomic position of the implant matches the preoperative design.

80 THE MICROSURGEON'S ROLE IN THE TREATMENT OF PATIENTS WITH RHABDOMYOSARCOMA OF THE HEAD AND NECK
CJI Temple, DW Chang, HN Langstein
Although rhabdomyosarcoma (RMS) of the head and neck is primarily a nonsurgical disease, the microsurgeon may be called upon to reconstruct defects from recurrent tumors requiring radical resection and to treat toxicity of prior radiotherapy.

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17 patients with RMS treated at MD Anderson Cancer Center (1990-2002) were identified and reviewed to define reconstructive principles.

Group 1: Thirteen patients were reconstructed after radical resection. The mean age was 16.6 yrs (13.4-30.9 yrs). Eight patients had one or more previous recurrences. 11 received 62.6 Gy. Seven had skin flap resections. 19 flaps were used, the most common being the free rectus abdominis flap. Three patients developed at least one post-operative local recurrence. Six patients are alive at 3.4 years (0.1-10.3 years). Group 2: Four patients were seen for complications of prior therapy, including radiation-associated sarcomas (1), mandibular osteoradionecrosis (1) and facial deformity (2). The mean was 8.2 years (2.5-13 yrs). The mean radiation dose was 62.5 Gy. One patient had a skin flap resection. A total of two flaps were used, including one free rectus and one free scapular flap. Two patients went on to radiation.

Successful reconstruction requires anticipation of extensive, complex, skin flap resections in pediatric patients who have been previously operated and irradiated. The propensity for future local recurrences requires forthought in donor site and recipient vessels choice. Those seeking cosmetic correction will require large volume correction, and will likely require 2th nerve palsy addressed.

81 DELAY IN DIAGNOSIS OF SKIN CANCER PRESENTING AS CHRONIC WOUNDS: THREE CASE REPORTS
AD Armour, JMahoney
Referrals to chronic wound clinics are rarely urgent. Due to the scarcity of these specialized centers, chronic wound patients may wait several months for an appointment. Unfortunately, skin cancers such as squamous cell carcinoma and melanoma may be misdiagnosed as chronic wounds. Three such patients have been referred to our chronic wound clinic recently. All three were patients at an advanced stage at the time of their first consultation in our clinic. One patient had a pigmented heel ulcer for a year, and presented with metastatic melanoma to the liver and spleen. Another patient had lung metastases of squamous cell carcinoma arising in a leg burn scar. A third patient had bone involvement of a heel squamous cell carcinoma. Their management and clinical course are outlined. These unfortunate cases reinforce the importance of clinical suspicion and diagnostic investigation in the management of chronic wounds. Primary caregiver education, regarding early biopsy of suspicious wounds, is discussed.

82 TREATMENT OF NMSC AT A REGIONAL CANCER CENTER: COST/BENEFIT OF PLASTIC SURGERY PARTICIPATION
D Kim, J Davidson
The epidemiology and demographics of treating Non-Melanoma Skin Cancer (NMSC) at the Kingston Regional Cancer Centre was reviewed in the context of a cost analysis. Patterns of therapy were tracked over a 9-year period before and after the addition of a Plastic Surgeon to the medical staff. Participation by the surgeon at weekly, half day, multidisciplinary NMSC clinic comprised an elective minor surgical list and “ad hoc” consultations on selected patients at the request of the clinical Oncologists and Dermatologists. The effect of surgical participation in the clinic was a) reduction in the number of cases of NMSC being seen at the clinic each year and a shift in the choice of therapeutic modality to b) more surgery (42% increase) c) less radiation therapy (75% reduction) Taking into consideration the prevalence of NMSC, the economic benefits are evident given that, on average, surgical therapy for this condition can be provided at less than 1/5 the cost of radiation therapy.

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P01 PERIPHERAL BLOOD FIBROCYTES IN BURN PATIENTS
J Giaffare, L Yang, H Shankowsky, P Scott, A Ghahary, E Tredget
INTRODUCTION: In small wounds, fibroblasts are recruited from the wound edges into the wound space to secrete extracellular matrix (ECM) proteins, encouraging the natural progression of scar formation and subsequent tissue repair. Unfortunately, excessive production and deposition of ECM in the dermis results in hypertrophic scarring. The source of fibroblasts recruited in extensive wounds such as burn wounds is unknown. Peripheral blood fibrocytes, a newly identified leukocyte subpopulation enter the site of injury with inflammatory cells. Fibrocytes are able to produce ECM proteins including collagen and present antigens to T-lymphocytes.

HYPOTHESIS: Although fibrocytes constitute 0.5% of peripheral blood leukocytes, we hypothesize they are important in healing large surface area thermal injuries.

METHODS: Peripheral blood mononuclear cells were isolated from 18 burn patients (13 male, 5 female), mean age 32.8 ± 13.6 (13-59) and total body surface area injury (TBSA) of 42.7 ± 20.3% (10-90%). Compared to 12 sex and age matched controls (7 male, 5 female) with a mean age of 31.6 ± 9.9 (19-45). The percentage of fibrocytes cultured from PBMC was determined by fluorescence staining for type I collagen and flow cytometry.

RESULTS: The percentage of type I collagen-positive fibrocytes was significantly higher for patients than for controls (89.7 ± 9% vs 69.9 ± 14.7%, p < 0.001). This percentage was consistently higher for patients with >30% TBSA burn until one year: the highest percentage appearing within 3 weeks of injury.

CONCLUSIONS: The results demonstrate that fibrocyte differentiation is upregulated systematically in patients with large burn injuries; suggesting that fibrocytes may function as fibroblasts after migrating into the ECM. The role of fibrocytes in post-burn hypertrophic scar is being investigated to aid the development of therapies to reduce scarring.

P02 VASCULAR ANATOMY OF THE INTEGRUM OF THE THIGH
M Tang, CR Geddes, BP Thomas, SF Morris
INTRODUCTION: The increasing popularity of the anterolateral thigh perforator flap has made it the “gold standard” of skin flaps from the thigh region. However, the potential of other donor vessels supplying the integument of the thigh have yet to be fully elucidated. The purpose of the study was to review the vascular supply to the integument of the thigh with special attention to the numbers, diameter and area of supply by individual perforators from the various source arteries.

METHODS: A series of 15 fresh human cadavers were injected with the modified lead oxide and gelatin technique. The skin of the thigh was meticulously dissected preserving all perforators (≥0.5 mm in diameter) and their source vessels carefully noting its course through the septa or muscle. Angiograms of the skin were studied and the vascular territory of the source vessels was calculated.

RESULTS: The integument of the thigh was supplied by perforators from 6 source arteries. The average number of perforators, percentage of total skin area of the thigh supplied, ratio of musculocutaneous and septocutaneous perforators, average diameter (mm), and area (cm²) of each vessel was: (Superficial) Femoral [19.2, 35.5%, 7.3, 0.81, 523.6]; Profunda femoris [8.6, 22.5%, 1.9, 0.79, 321.4]; Medial circumflex femoral [7.6, 11.6%, 1.1, 0.69, 197]; Lateral circumflex femoral [16.4, 17.2%, 4.1, 0.71, 249]; Medial superior genicular [3.2, 6%, 3.2, 0.61, 76.4]; Lateral superior genicular [3.4, 7%, 1.2, 0.76, 86.2].

CONCLUSIONS: This study has provided detailed anatomical information about arterial perforators in the thigh. The average size and location of each territory, including the number of perforators and their description is presented.

P03 THE ZONAL PATTERN OF ARTERIAL SUPPLY TO THE BRACHIAL PLEXUS
BP Thomas
INTRODUCTION: The vascular supply to the brachial plexus has not been clearly documented. With the advent of procedures like vascularized nerve grafting and cadaveric allografting, knowledge of vascular anatomy of the brachial plexus is important. The purpose of this study was to comprehensively describe the arterial supply of the brachial plexus.

MATERIALS AND METHODS: This human cadaver study comprised of 2 parts. In Part 1, a radio-opaque injectate of 100mg of lead oxide in a 100 ml 5% gelatin (300 Bloom) solution was injected into fresh cadavers at 26 ml/kg. The brachial plexus (n = 4), along with the subclavian vessels and surrounding tissue were then removed. Under 4x magnification, the plexus was dissected to identify its arterial supply. The specimens were radiographed to document the angiographic pattern. In Part 2, the brachial plexus of embalmed human cadavers were meticulously dissected under 4x magnification to trace any identifiable vessel to the brachial plexus (n = 10).

RESULTS: Arteries derived directly from the subclavian artery and its major branches supplied the brachial plexus. Three zones in the plexus were identified by the study, each being supplied by its nutrient artery. The nutrient artery in each zone, on reaching the plexus divided into ascending and descending branches. Each of these branches then anastomosed with the corresponding branches of the neighbouring
RESULTS:

inadequate health care treatment. Pediatric morbidity and mortality in Pakistan are

OBJECTIVE:

examine how international collaborative care can benefit these children.

RESULTS:

in 1 to 53% of the population and represents a dominant blood supply to the hand in

CONCLUSIONS:

of deaths in children are a result of delayed surgical intervention. Poverty and an

CONCLUSIONS:

Five children with severe, disfiguring injuries are described to illustrate the inadequate medical care available in Karachi.

P06

PEDIATRIC INJURIES IN KARACHI, PAKISTAN: A MEDICAL STUDENT’S PERSPECTIVE

V Pirani, WG Cannon, C Verchere, JC Boyle

Pediatric injury and death in Pakistan are commonly due to child abuse, child labour, motor vehicle collisions, land mines, civil war and acts of violence. More than 20% of deaths in children are a result of delayed surgical intervention. Poverty and an inability to access appropriate medical care and complications contribute to high morbidity and mortality among children. Injury to a child in Pakistan dramatically reduces economic productivity for his or her life span, but also has significant social ramifications. Common dismal outcomes include suicide, abandonment by shamed families, or a life on the street of begging or prostitution. More than 50 impoverished children injured in Karachi are treated in local hospitals without cost and a few selected complex surgical cases are sent for treatment to the United States (funded by the corresponding branches from the neighbouring zones. Zone III included the proximal origins of the individual nerves from the cords.

CONCLUSIONS:

The brachial plexus derives its arterial supply from the subclavian artery and its branches. Three zones could be identified based on the vascular supply. Zone II can theoretically supply all 3 zones through choke vessels.

P05

HAND REPLANTATION DEPENDENT ON THE MEDIAN ARTERY

GT Gotho, JS Williamson, H Clarke, NJ Carr, PA Clugston

The median artery represents a dominant blood supply to the hand during early fetal development and subsequently regresses. A persistent palmar median artery is present in 1 to 53% of the population and represents a dominant blood supply to the hand in a subset of cases. Hand replantation dependent on a persistent median artery has not been previously described. Two cases of successful hand replantation involving microvascular reanastomosis of a persistent palmar median artery are described.

P04

COMPARISON OF VASCULAR ACCESS AND AMPUTATIONS IN PATIENTS RECEIVING RENAL REPLACEMENT THERAPY.

S Vachhrajan, B Burwell, B Clapsom

As part of a study of extremity gangrene in renal failure, the relationship between vascular access and amputations was investigated. The hypothesis was that an increased number of access procedures were correlated with an increased amputation rate. We conducted a retrospective chart review to determine if any significant difference existed between the side of upper limb amputation and the side of the preceding fistula creation.

Vascular disease is a known complication of chronic renal disease. Diabetes mellitus is the leading cause of chronic renal failure, and accelerated atherosclerosis leading to macro and microvascular disease. Dialysis is usually necessary and the coexistent vascular disease makes the provision of vascular access difficult with repeated procedures often being necessary.

Twenty-one patients underwent 62 vascular access procedures. Forty-eight amputation procedures were carried out on these patients. A correlation factor of –0.26 was found, indicative of a slightly negative relationship between the two variables. Pertaining specifically to the upper limb, 32 fistulas were created for these patients, 25 on the left side and 7 on the right. Nineteen fingers were amputated and 3 forearms were removed. Analysis revealed no statistically significant difference for the side of amputation when fistulas were created on the left side (p=0.5), or on the right side (p=0.18). Repeated vascular access procedures do not result in higher amputation rates.
RP03
THE ROLE OF PALATO-ALVEOLAR MOLDING IN THE CURRENT MANAGEMENT OF CLEFT LIP AND PALATE: A MULTI-INSTITUTION REVIEW

J MacDonald, RA Latham, D Matic

INTRODUCTION: Clipping of the lip and palate is the commonest congenital facial anomaly in humans. Children with clefts of the primary and secondary palate require multiple operative procedures throughout life. Management regimes are numerous and vary between institutions. Pre-surgical orthodontics is used to align the cleft segments and reduce the overall size of the cleft. Direct molding (passive or active) of the palate and alveolus is one form of pre-surgical orthodontics. Passive molding techniques use an intraoral splint that fits onto the palatal segments utilizing the normal growth of the palate to realign the segments. Active techniques use a splint that is directly fixed to the palatal segments that are then aligned by way of an applied force. One such device is known as the Latham palatoplasty appliance. This questionnaire will be administered both by e-mail and the postal service. It is anticipated that a 20-30% response rate will be obtained.

PURPOSE: This study aims to identify the role of palato-alveolar molding in current cleft care. This will be achieved through identifying the variety of techniques used, patient selection criteria, perceived benefits and outcomes, limitations, and complications.

METHODS: A comprehensive questionnaire will be sent to directors of all cleft lip and palate centers in North America that are registered with the American Cleft Palate Association. This questionnaire will be administered both by e-mail and the postal service. It is anticipated that a 20-30% response rate will be obtained.

RESULTS: Our results will focus on the perceived indications for molding the palate and alveolus, advantages and disadvantages, complications, and perceived benefits.

RP04
USE OF ABDOMINAL QUILTING SUTURES FOR SEROMA PREVENTION IN TRAM FLAP RECONSTRUCTION: A PROSPECTIVE, CONTROLLED TRIAL

C McCarthy, P O'Sullivan, P Lemmon

INTRODUCTION: The use of quilting sutures during closure of abdominal flaps in TRAM flap reconstruction may decrease dead space thus preventing abdominal seroma formation. The purpose of this study is to evaluate the effect of quilting sutures on drain output/day, time to drain removal and the incidence of abdominal seroma formation in patients undergoing TRAM flap reconstruction.

METHODS: 72 consecutive patients who underwent TRAM flap breast reconstruction between November 2000 and December 2002 were included. Patients were randomly assigned to receive abdominal quilting sutures. Two abdominal drains were used in all patients. Drains were removed when output ≤ 30cc/24 hours. Drain-output/day for the first three post-operative days and time to drain removal were recorded. Clinical evidence of seroma formation detected via palpation was recorded during routine follow-up.

RESULTS: Mean drain output/day was 74.8 cc with the use of quilting sutures and 86.8 cc without (p=0.209). Mean time to drain removal was 6.9 days with quilting sutures and 7.3 days without quilting sutures (p=0.528). The incidence of clinical seroma formation was 15.4% with the use of quilting sutures and 16.1% without (p=0.893).

CONCLUSION: The use of abdominal quilting sutures in patients who undergo breast reconstruction using the TRAM flap is not supported by this study. Drain output per day significantly decreased with the use of quilting sutures however the time to drain removal was not significantly affected. Most importantly, there was no significant decrease in the incidence of seroma formation with the use of abdominal quilting sutures in this series.

RP05
REPEAT BREAST REDUCTION

L Montalin, H Ciaburro, C Cordoba, G Frenette, P Harris, E Hashim

Secondary reduction mammoplasty is not a frequent surgical procedure. The fear of a necrosis of the nipple-areola complex (NAC) exists, and most especially when the initial pedicle is unknown. The aim of the present study is to validate or invalidate the safety of the use of a different pedicle during a secondary reduction mammoplasty. To this day, the two studies on this subject resulted in opposite conclusions. In order to enlighten the situation, we have studied retrospectively all the patients who were operated for a repeat breast reduction at the Centre Hospitalier de l'Université de Montréal, Pavillon Notre Dame, between 1972 and 2002. Only the patients operated for a secondary mammary reduction of 250 gr. and more for each breast were included. Those operated with an excision of less than 250 gr., or for simple mammopexy or liposuction were left out. 38 patients were identified as subjects who went through a secondary reduction mammoplasty with excision of more than 250 gr. by breast. The patients were divided into three groups according to the similarity of the techniques used during the two operations. There were no necrosis of the NAC among the patients of the first group (same pedicles) (33/30 breasts), two necrosis of the NAC among those of the second group (different pedicles) (2/18) and four necroses of the NAC among those of the third group (unknown initial pedicle) (4/28). These data are not statistically significant, partly due to the small size of the sample. Therefore, until we get results from a bigger sample we suggest the use of identical pedicles or a free nipple-areola graft when the initial pedicle is unknown, and this, in order to minimize the risk of necrosis of the NAC in a repeat breast reduction.

RP06
SHOULDER MORBIDITY FOLLOWING OSTEOCUTANEOUS SCAPULAR FLAP RECONSTRUCTION OF THE HEAD AND NECK: A PILOT STUDY

DQT Nguyen, TW Matthews, J Yoo, K. Faber, DC Ross

The free osteocutaneous scapular flap (FOCS) is commonly used in the reconstruction of composite defects in the head and neck. The purpose of this study is to determine the significance of shoulder dysfunction, following harvest of the FOCS using objective and patient rated outcomes.

METHODS: Objective shoulder function was tested, using a computerized LIDO 2 Workset and an established shoulder assessment protocol, to determine patients' postoperative shoulder range of motion and strength. To obtain data regarding subjective patient-rated outcomes, patients were asked to complete three validated outcome tools: SF-36, Disabilities of the Arm, Shoulder and Hand (DASH) and the Western Ontario Rotator Cuff (WORC) questionnaires. A control group of 8 patients in whom equivalent neck dissections had been performed and free radial forearm flaps (FRFF) harvested was tested to control for the potential confounding effect neck dissections may have had on patients' shoulder function.

RESULTS: The objective data revealed significantly poorer strength of ipsilateral shoulder internal/external rotation in patients from whom an osteocutaneous scapular flap had been harvested. The results of the patient-rated outcome questionnaires revealed patient perception of significant upper limb disability (DASH) and poorer physical condition (SF-36) following the procedure. In addition to these, trends toward poorer quality of life (WORC) and general health perception (SF-36) were noted.

CONCLUSION: The free osteocutaneous scapular flap is valuable in head and neck reconstruction but its benefit must be weighed against the significant morbidity of decreased shoulder function and resultant perception of poorer health in this group of patients.

RP07
LONG TERM FOLLOW-UP OF PERICHONDRIAL ARTHROPLASTY FOR PROXIMAL INTERPHALANGEAL AND METACARPAL PHALANGEAL JOINT ARTHROPATHY AND REVIEW OF THE LITERATURE

C Schrag, R Lindsay

INTRODUCTION: Several techniques of arthroplasty may be used to treat stiff and/or painful joints of the hand. While resection interposition arthroplasty with silicone implant remains the most common method of reconstruction, the implants are prone to breakdown and fracture over time. Skoog and Johanson first described autologous reconstruction of a metacarpal phalangeal joint using rib perichondrial grafts, which regenerated new articular cartilage. Over the past thirty years only a handful of reports have documented the use of perichondrium in the hand, all with mixed results. None have documented follow-up longer than seven years.

OBJECTIVE: The purpose of this study was to report the long term results of perichondrial arthroplasty of the proximal interphalangeal and metacarpal phalangeal joints.

METHODS: All arthroplasties performed by the senior author were isolated using the hospital database. Patient charts were screened to identify those individuals who had undergone perichondrial arthroplasty. Study patient charts were reviewed to identify indications for surgery, patient demographics, pre-op and post-op range of motion, presence or absence of pain, overall function, patient satisfaction. Any complications of the surgery, including donor site morbidity and joint infection were recorded. Patients were also contacted directly to assess current status.
A 24 YEAR REVIEW OF BURN INJURIES IN CHILDREN
DA Peters, WG Cannon, JM Prince, Y Pirani, C Verchere, E Germann, CFT Snelling, JC Boyle

Our objective was to determine whether the cause, severity or outcome of burns in children (<16) was related to age. Data was collected for all pediatric burns treated in our burn units between 1978 and 2001 (n=1059). The incidence of scald burns decreased with age. 81.3% of burns in children under 1 year of age were a result of scald. In contrast, the incidence of flame burns increased as children get older. 73.6% of burns in children aged 13-16 were a result of flame. Child abuse, although rare (n=12), occurred exclusively in children 4 years of age and younger. Younger children were more likely to be burned at home while older children were more likely to be burned at leisure, at school or at work. There was no relationship between age and size or severity of burn. In particular, there was no relationship between age and %TBSA, %TFT or need for operative closure of wounds. Most common complications were urinary tract infection (9.9%), burn wound infection (7.7%) and pneumonia (3.2%). No relationship was found between age and complications. 48.3% of subjects had wound colonization with at least one organism. The most common organisms were S. aureus (57.3%), coagulase negative Staphylococci (26.8%) and Enterococcus (20.5%). Although colonization with P. aeruginosa was less common (8.6%), it was more likely to occur in older children. Nine children with a mean %TFT of 48% died. All of the deaths occurred in children older than 1 year of age.

CARPAL TUNNEL SYNDROME AND WORKER’S COMPENSATION: A CROSS CANADA COMPARISON
RJ Watts, K Osei-Tutu, DH Lalonde

INTRODUCTION: Carpal tunnel syndrome (CTS) is the most common peripheral entrapment neuropathy. Importantly, it is also the source of substantial workers compensation claims in industrialized countries. Its pathogenesis, however, continues to be questioned.

PURPOSE: The purpose of this study is to assess the attitudes of Canadian Plastic Surgeons toward WCB supported claims for CTS and to assess patterns of resource allocation across Canada.

METHODOLOGY: 67 plastic surgeons at the 2002 CSPS meeting were surveyed. Provincial WCB offices were contacted and asked to provide statistics surrounding CTS claims for 1997-2001.

RESULTS: 58% (39/67) of surgeons surveyed felt that carpal tunnel syndrome should be covered as a WCB claim while 42% (28/67) felt that it should not be covered by WCB. In British Columbia, 50% (6/12) of surgeons were in support of the claim compared to 92% (11/12) of those from Alberta, 55% (17/31) of those from the Central Provinces and 42% (5/12) of those from the Maritime Provinces. Trends of WCB resource allocation will be presented for each province from 1997-2001.

INTERPRETATION: The theory that CTS is related to repetitive stress has received some support. The big question is: Is carpal tunnel syndrome caused by work or is carpal tunnel syndrome a preexisting condition which is aggravated by work? However, in an extensive literature review, no causal relationship between repetitive work tasks and CTS can be reproduced. Relating back to the definition of a compensable claim, in a setting of Medicare strain, is worker’s compensation for CTS valid? These issues will be discussed.

UTILITY SOFT TISSUE RECONSTRUCTION IN MCP ARTHROPLASTY
H Burezq, GN Polyhronopoulos, S Beaulieu, HC Brown, HB Williams

PURPOSE: The purpose of this study is to evaluate the long-term effect of metacarpophalangeal joint arthroplasty using silastic prosthesis with radial collateral ligament reconstruction and abductor digiti minimi release.

METHODS: In a review from 1991 to 2001, 18 patients (24 hands) had metacarpophalangeal joint arthroplasty. Using the same operative technique MCP arthroplasty was performed in all patients, with the exception of radial collateral ligament reconstruction and abductor digit minimi release, only performed in group I. In group I, 60 MCP joints in 15 hands of 11 patients were operated on and 36 MCP joints in 9 hands of 7 patients in group II. Patients were evaluated at a mean follow up time of 63 months, and pre- and post-operative hand x-rays were compared. A comparison between groups was made in terms of post-operative MCP joint flexion,