

### P31: Finite Element Analysis of Fixation Plates for Mandibular Fracture Stabilization

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**OBJECTIVE:** To use finite element analysis (FEA) for evaluation of the biomechanics of plates used for the repair of mandibular fractures.

**METHODS:** Computerized tomography (CT) data for the normal human mandible were obtained from a patient's craniofacial region imaged in the axial plane at 1.5 mm intervals. These data were then imported into Mimics 7.3 (Materialise, Glen Burnie, MD, USA) in image format. Masks for cortical bone, cancellous bone and dentin were designated separately with tools available in Mimics. The masks for each entity were approximated by IGES curves and imported into ANSYS 8.0 (Ansys Inc., Canonsburg, PA, USA). The volumes created for these entities were meshed using tetrahedral shaped solid elements. Each entity was modeled as elastic and isotropic. Data for ultimate tensile strength, Poisson's ratio and Young's modulus for each entity were taken from information on the material properties of the mandible available in the literature. An artificial gap was created in the symphysis of the mandible to mimic a fracture. Plates were created and shaped to the contour of the mandible overlying the region of the fracture using Solid Works 2001 Plus (Solid Works Corporation, Concord, MA, USA). The plates were then exported in IGES format into the pre-existing model of the mandible in ANSYS. Four plate configurations were compared for fitness of use (Fig. 1): ladder; large/small band; small bands; and large band. Unicortical and bicortical screws were simulated as solid cylinders. The force of the unilateral molar clench used for FEA was 150 N (Fig. 2).

**RESULTS:** All bone-screw-plate constructs showed peak Von Mises stress surrounding the superior border of the screw proximal to the fracture on the side ipsilateral to the clench. Stresses did not exceed the ultimate stress for bone (120 MPa) in the region surrounding the screws on the anterior cortical surface. Stresses along the screw decayed towards the cancellous bone along the screw-bone interface. All configurations tested showed little or no stress in cancellous bone or lingual cortex. All configurations showed maximal tensile stress on the lower border of the mandible and maximal compression on the superior border.

**CONCLUSION:** On the basis of FEA, we conclude that all plate configurations tested are suitable to repair mandibular fractures. Unicortical screw fixation is adequate for fixation. Time required for contouring and fixation along with other ancillary features should be the principal criteria in selection of specific types of plates for mandibular fracture reduction.

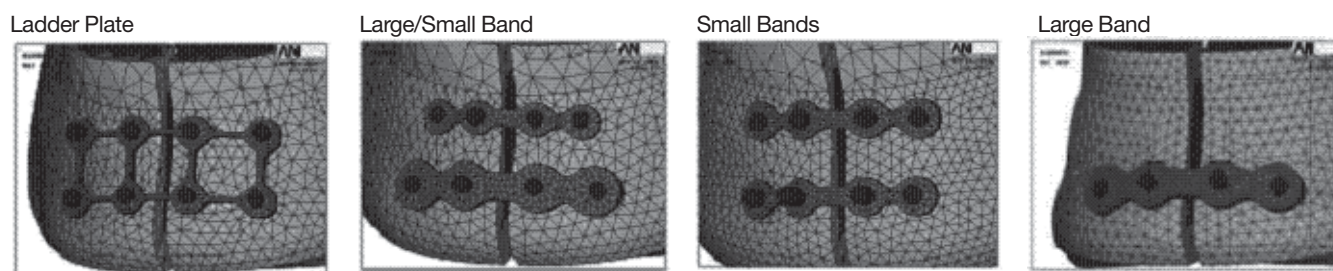


Figure 1. Plate Types and Configurations.

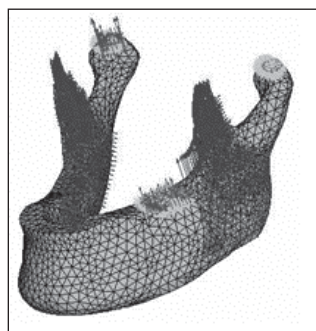


Figure 2. Finite Element Modeling of Unimolar Clench Force.

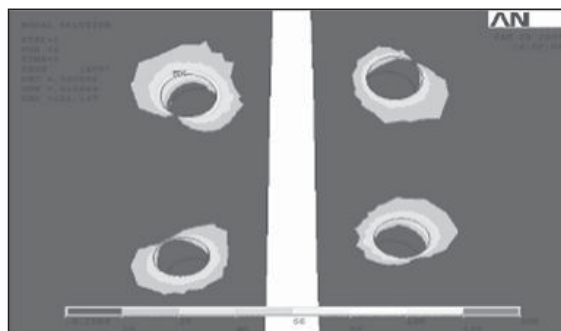


Figure 3. Von Mises Stress (MPa) in Cortical Bone for four screws proximal to fracture surface — Ladder Plate.

## **P32: Influences on Decision-Making Regarding Having Plastic Surgery: A Mental Models and Quantitative Assessment**

*Sarah L. Thorne, MA; Tanya Darisi, MA; Carolyn Iacobelli, BA*

Along with the increasing popularity of cosmetic plastic surgery, there is the growing concern among member surgeons of the American Society of Plastic Surgeons that communication processes outside the control of plastic surgeons may not be providing the realities, including risks, of having plastic surgery. This research was undertaken as part of the ASPS 2005 Plastic Surgery Education Campaign (PSEC).

**METHOD:** Using a mental models approach, research was conducted to gain insight into potential patients/consumers' decisions to have plastic surgery, their perception of benefits and risks, their judgment of outcomes, and their selection of a plastic surgeon.

The mental models research approach employs semi-structured, open-ended interviews to reveal individual thinking in depth, focusing on influences involved in decision-making and behavior.

An "expert model" was developed from interviews with 13 plastic surgeons. This model was then used as the framework for the mental models interviews, which were conducted with 60 people actively engaged in the decision to have plastic surgery.

Qualitative analysis provided insight into participants' perception of the benefits and risks associated with plastic surgery, their judgment of outcomes, and their selection of a plastic surgeon.

Following the mental models research, a web-based survey was conducted to provide further insight, on a national scale, into the factors that influence the decision to have plastic surgery. 644 individuals considering plastic surgery responded to the survey.

**RESULTS:** Participants' interest in, and motivation towards, plastic surgery was influenced by the experiences of friends, family and colleagues, as well as by seeing successful results on television shows. Most interview participants believed that they could achieve emotional, psychological and social improvements by having plastic surgery. Looking better was seen to be the way to feeling better.

Participants frequently discounted potential criticisms of their decision to have plastic surgery and asserted that they were making their decision for their own personal benefit. They considered plastic surgery to be a legitimate option for achieving change in their lives.

Surgeon selection was a critical influence on decisions to have plastic surgery. Mental models interview participants gave considerable weight to personal consultation and believed that finding the "right" plastic surgeon would minimize potential risks.

Consultation was particularly valued for establishing a relationship with a plastic surgeon and for helping potential patients to feel confident and assured in their decision. A sense of trust and confidence in the surgeon was related to participants' perception of surgery outcome.

Findings from the web-based survey were generally consistent with the mental models research but differed on surgeon selection criteria. Mental models participants appeared to rate surgeon selection criteria higher in importance than the web-survey respondents. These differences between the two groups appear related to the level of experience with plastic surgery and plastic surgeons.

**CONCLUSIONS:** From this research, we conclude that potential patients are thoughtful and actively engaged in the decision to have plastic surgery. While they associate very specific benefits with having plastic surgery, they appear to think more generally about the potential for negative outcomes. Concerns about possible risks are resolved by gathering information through Internet research and talking to others who had had plastic surgery. There is also the perception that risks will be minimized if one researches and selects a skilled and experienced plastic surgeon. The practical application of the research will allow for the design of a communication process that will address patient/consumer mental models, and will be both meaningful and useful to decision-making.

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### P33: Inframammary Fold Creation in Breast Reconstruction

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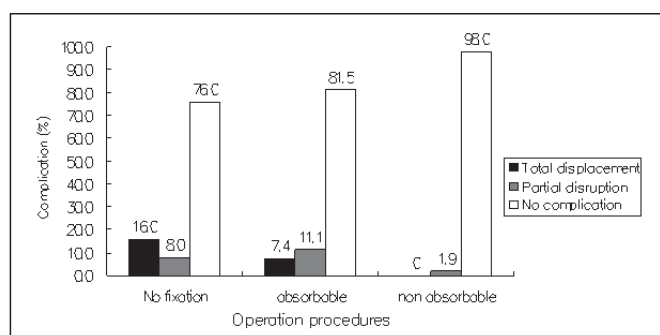
**PURPOSE:** To address the importance of the inframammary fold in autologous breast reconstruction using free tissue transfers.

**INTRODUCTION:** Autologous breast reconstruction is commonly performed after mastectomy for its natural shape, projection, and feel. A natural inframammary fold in the reconstructed breast is considered to be an essential aspect of achieving an optimal result although there is no data to support this notion. This study addresses whether formation of an inframammary fold during free TRAM breast reconstruction is needed to maintain the shape and placement of the flap.

**METHODS & MATERIALS:** A total of 104 patients underwent breast reconstruction with a free TRAM flap from 1995 to 2003. Patients were divided into three groups. One group (N=25) had no suture fixation of the inframammary fold. The second group (N=27) had an inframammary fold created with absorbable sutures (3-0 Vicryl). The last group (n=52) had the formation of the fold with nonabsorbable sutures (3-0 mersilk). The mean follow up for each patient was 3 years.

**RESULTS:** In the group of patients without the inframammary fold creation, there were 4 cases (16%) of flap displacement and 2 cases (8%) of inframammary fold disruption. In the group with absorbable suture fixation, 2 cases (7%) demonstrated displacement of the flap and 3 cases (11%) of partial inframammary fold disruption. In the group with nonabsorbable suture fixation of the inframammary fold there was only one case (2%) partial disruption of the fold. There were no cases of flap displacement.

**CONCLUSION:** Our data indicate that reinforcement of ligamentous structures for making a definite inframammary fold is necessary to maintain flap placement and shape. We also determined that it should be recreated with nonabsorbable sutures. Preoperative markings and design are essential to achieve breast symmetry and to mark the location of inframammary fold. While performing breast reconstruction the area of the inframammary fold should not be undermined in order to preserve the zone of adherence.



**Figure 1.** Comparison between outcomes of different operative procedures.



**Figure 2.** The ligamentous fold was reinforced or created by internal sutures of dermal layer of abdominal skin to the fascia of rectus abdominis muscle, serratus anterior muscle and pectoralis muscle with 3-0 mersilk.

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### **P34: Integrated Titanium and Vascular Bone: A New Approach for High Risk Thoracic Spine Reconstruction**

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**ABSTRACT:** The treatment of high-risk patients in spine stabilization can be fraught with complications. Patients who have had prior surgery for spine reconstruction, a history of perioperative spine infection, radiation therapy application and multi-organ disease are at high risk (40–50%) for failure using conventional spine stabilization as described in the current literature. A combined construct, using a pedicled myo-osseus rib flap in a titanium cage, is described to treat such patients. A prospective series of 13 high-risk patients (aged 28 to 73) is detailed, including patient outcomes, CT studies and bone scans comparing the results to conventional reconstructive methods. A latissimus-sparing left thoracotomy is performed (100 minutes average), allowing for treatment of anterior spine disease and inset of construct. 100% viability of the vascular construct is seen, with no relapse of disease. The vascular rib construct is demonstrably safe, reliable, and time efficient. It effectively stabilizes the spine and obliterates the dead space associated with traditional techniques. This construct offers major advantages over traditional non-vascularized bone reconstruction. We propose an algorithm for its use routinely after failure of conventional reconstruction, and describe a rationale for its use as primary reconstruction for a defined population of high-risk patients.

**METHODS:** Thirteen high-risk spine patients with 31 comorbidities were followed prospectively after anterior spinal fusion using the titanium cage/intercostal rib flap construct. Patients' primary indication, clinical history and co-morbidities, are listed in the table below. Post-operative follow-up included clinical assessment of symptoms and stability as well as imaging of reconstructed levels. To delineate fusion status, imaging was obtained in every case by Computed Tomography, Magnetic Resonance Imaging, or Radionuclide bone scan.

**TECHNIQUE:** The patient is induced using a dual lumen endotracheal tube. Invasive lines and catheters are placed by anesthesia. The patient is placed into a right lateral decubitus position, on a beanbag. A standard anterolateral thoracotomy incision is made at T 6. Elevating the pectoralis major, anterior, and the latissimus, posterior expose the chest wall. Choosing the segment above or below the site of pathology isolates the desired rib. The intercostal myo-osseous segment is isolated and dissected prior to entering the pleural space. The costo-chondral attachments are preserved, while the lateral segment of rib is separated from the underlying periosteum and attached muscle. The dissection continues along the cephalic border of the desired rib. A typical segment length of six to eight centimeters is defined anteriorly, at the costo-chondral junction. Separating the muscle from the superior border of the next rib preserves the intercostal muscle, with the neurovascular bundle of the desired rib. The lateral undesired rib segment is removed and preserved for potential later use. The pleural space is opened and the flap is freed from its cartilaginous attachments. Graft viability can be assessed at this point by trimming both ends of the rib; brisk bleeding indicates viability. The rib spreaders are placed for thoracotomy exposure and corpectomy is undertaken. Upon completion of the corpectomy, the rib is tailored to the length of the corpectomy defect. The rib is fitted into the cage, avoiding torsion of the pedicle. The pedicle is left with sufficient laxity to obliterate potential dead space and cover the external surface of the titanium cage. The latissimus sparing thoracotomy is closed in layers over a 32 French chest tube (see illustrations).

**RESULTS:** All patients demonstrated clinical and radiographic evidence of spinal fusion at the mean follow-up time of 27 months (range 25–55 months). Moreover, every patient reported a significant improvement in back pain and all patients were ambulatory. In the early post-operative period, one patient developed pleural effusions requiring thoracostomy drainage, and one patient developed bacteremia related to a central venous catheter. Both these complications resolved completely. One patient was lost to follow-up, and another expired of gram-negative sepsis with a stable reconstruction 6 weeks post-operatively. The remaining eleven patients were followed as described. Two late mortalities were noted: one from unrelated intracranial hemorrhage at 25 months, and one from metastatic breast cancer at 27 months post-operatively.

**CONCLUSION:** Understanding the vulnerabilities of traditional approaches to reconstruction led to use of the new construct in re-operative settings. Our experience in spinal instability secondary to tumor or infection,



especially in the setting of myriad co-morbidities suggested a combined titanium/vascular rib construct was the ideal solution. The titanium cage construct provides greater mechanical support, the viable graft offers a shorter incorporation time, and preservation of the blood supply provides a means for medical treatment (antibiotics, chemotherapy) to reach the area of concern. Judging by the percentage of successful surgeries for high-risk patients with multiple co-morbidities, reconstruction using the construct is an ideal solution. Rather than waiting for failure of conventional methods, it has become our practice to use the construct increasingly in primary reconstruction for select patients whose circumstances predispose them to failure of conventional reconstruction. For spinal reconstruction in high-risk cases, we propose a new approach: primary reconstructive use of an integrated titanium cage/pedicled rib graft construct.

**Table 1.** Clinical Presentation.

Pt	Age	Diagnosis/Indication	Co-morbidity	Fusion/Level of Reconstruction
GF	57	T10-T12 diskitis	Hypertension, diabetes	T10-T11
PH	38	Spinal infection. T11-T12, L1	Type II diabetes, retinopathy, L. lower lobe empyema multiple operations — osteomyelitis and paraspinal abscess of T11-T12	T11-T12
KE	63	Thoracic osteomyelitis and epidural abscess	Hypertension, Parkinson's, CVA, Prior Laminectomy T7-T10, C/B wound infxn. (+MRSA)	T8-T9 ASF T4-L1 PSF
LE	44	Osteomyelitis at T7 and T8	Destructive lesion T7-T8; epidural & Pre-Vertebral abscess	T9-T10 corpectomy, Ant. Spinal Fusion
WS	53	T7 metastatic spine tumor with pathologic fracture	Uterine cancer, urinary cancer, Hypertension	T7 corpectomy with decompression
SM	61	Metastatic breast CA spread to Thoracic spine	Hypertension Breast cancer (chemotherapy)	T9
RD	66	Chronic osteomyelitis of cervical spine	Hypertension, hypoxic encephalopathy, end-stage renal disease	
VS	49	Thoracic diskitis & osteomyelitis w/ compressed fracture at T7-T8	Previous spine surgery (post epidural abscess excision), Hypertension, diabetes	T7-T8
RP	28	T8 vertebral corpectomy for carcinoma	Endometrial BA and secondary metastases of spine leukemia – chemo- & radio-therapy	T8
DW	45	Thoracic mass with epidural compression and spinal cord compression	HIV infection	T6-T7
CL	32	Metastatic disease to thoracic spine	Metastatic Breast cancer	T11 corpectomy
SA	73	Thoracic abscess ( <i>mycobacterium chelonae</i> )	Hypertension	T7-T8 ant. corp & post fusion T2-T11
BM	45	Osteomyelitis, severe kyphosis	Hyperparathyroidism, end-stage renal disease, Hypertension, Pseudomonas serratia sepsis	T7-T9



**Figure 1.** Pedicled costal flap for integration in titanium cage.

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### **P35: Intralesional Cryosurgery for Enhancing the Involution of Hypertrophic Scars and Keloids — A New Effective Technology Based on Experimental and Clinical Data**

**Yaron Har-Shai, MD; Edmond Sabo, MD; Ewa Rohde, MD; Michael Hayms, MD; Chalid Assaf, MD; Eytan Dujovni, MD; Christos C. Zouboulis, MD**

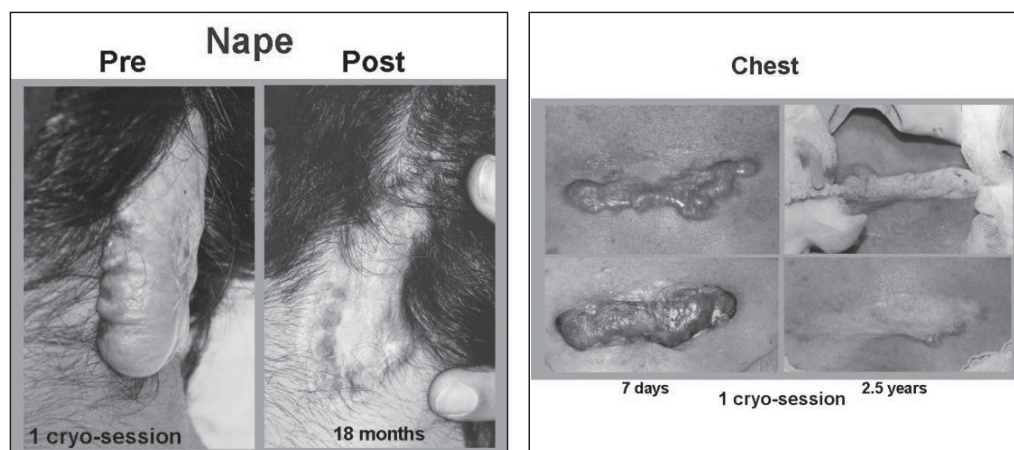
Although therapeutic management of hypertrophic scars and Keloids (HSK) using contact or spray cryosurgery was shown to yield significant improvement or complete regression of HSK, it requires 1–20 treatment sessions and causes permanent hypopigmentation. This study was designed to assess the clinical safety and efficacy of an intralesional needle cryoprobe method in the treatment of HSK.

**METHOD:** 95 Caucasian patients (51 females; 44 males), ranging in age from 3 to 67 years, with a total of 112 HSKs (chest-62; auricular and lobular-26; shoulder-7; neck-4; abdomen-4; breast-4; nape-3; arm and forearm-2) of more than 6 months duration and of diverse causes were included in this study. A specially designed cryoneedle (U.S patent 6,503,246) is inserted (usually under intralesional local anesthesia with 0.5% Bupivacaine Hcl) into the long axis of the HSK so as to maximize the volume of the HSK to be frozen. The cryoneedle is connected by an adaptor to a cryogun filled with liquid nitrogen, which is introduced into the cryoprobe thereby freezing the HSK. After the HSK is completely frozen, the cryoprobe defrosts and is withdrawn. The 18-month trial evaluated volume reduction of the HSK following a single session of intralesional cryosurgery. Objective (hardness and color) and subjective parameters (pain/tenderness and itchiness/discomfort) were examined on a scale of 0–3 (low score was better). Pre- and post-treatment biopsies were taken for histo-morphometric studies of the collagen fibers included spectral Picrosirius red polarization, fractal analysis and Fast Fourier Transform algorithm orientation index. Surface thermal behavior measurements using thermocouples were executed in a swine muscle specimens (ex-vivo) and during clinical treatments to measure the thermal history and injury mechanisms of the intralesional cryosurgery as well as to visualize the tissue damage when compared with the standard contact cryosurgery technique.

**RESULTS:** An average of 51.4 % of scar volume reduction was achieved following one session of intralesional cryosurgery treatment (average preoperative HSK volume =  $1.82 \pm 0.33$ ; average post-treatment volume =  $0.95 \pm 0.21$ ;  $p < 0.0022$ ). Specifically, for auricular and lobular keloids the average volume reduction was  $67.4 \pm 23\%$  ( $2.89 \pm 0.64$  cm<sup>3</sup> before treatment;  $1.17 \pm 0.46$  cm<sup>3</sup> after treatment ( $p < 0.005$ )). In 8 scars of the 112 no response to the intralesional treatment was achieved. Significant alleviation of objective and subjective clinical symptoms was documented. Mild pain or discomfort during and after the procedure was easily managed. Only mild local edema and epidermolysis, followed by a short re-epithelization period, were evident. During the 18-month follow-up period there was no evidence of bleeding, infection, adverse effects, or permanent depigmentation. The histomorphometric analysis demonstrated rejuvenation of the treated scars, i.e., parallelization, and a more

organized architecture of the collagen fibers when compared to the pre-treated scars. The surface thermal history during the intralesional cryosurgery procedure demonstrated a significant different pattern when compared with the contact technique. The slow cooling ( $6.09 \pm 4.56$  °C/min;  $p < 0.00001$ ) and thawing rates ( $13.47 \pm 9.04$  °C/min;  $p < 0.00001$ ) together with a less pronounced end temperature ( $-15.55 \pm 6.77$  °C;  $p < 0.00001$ ), which is more “friendly” to the melanocytes, and a significant long hold time ( $82.67 \pm 138.03$  sec) until complete freezing is achieved during the intralesional technique might explain the effectiveness of this new technology and the absence of permanent hypopigmentation which was clinically demonstrated. Furthermore, lower temperatures are present at the core of the HSK (abutting the cryoneedle) which increase the freezing area of deep scar material causing cryoinjury which is more effective than the contact method. In contrast, the contact technique causes a severe superficial necrosis harming the melanocytes and is less effective to the core of the HSK.

**CONCLUSIONS:** This study demonstrated the increased efficacy of the intralesional cryosurgery method due to increased freezing area of deep scar material compared with that obtained with contact/spray probes. As a result, fewer treatment cycles are needed. Since the re-epithelialization period is short, treatment intervals — if any can be shortened to 3–4 weeks. This intralesional cryoneedle method is simple to operate and requires a short learning curve, safe to use, consumes less liquid nitrogen fluid per treatment, avoids the need for time taking during the freezing process, necessitates less postoperative care of the wound, and can easily be added to any preexisting cryosurgical unit.



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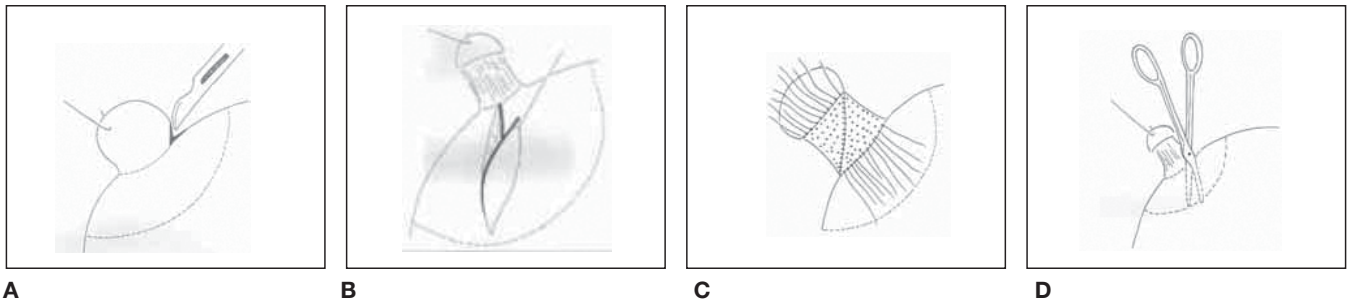
## P36: Inverted Nipples: A New Technique for Correction

**Menelaos Vassiliou, MD; Mimis Cohen MD**

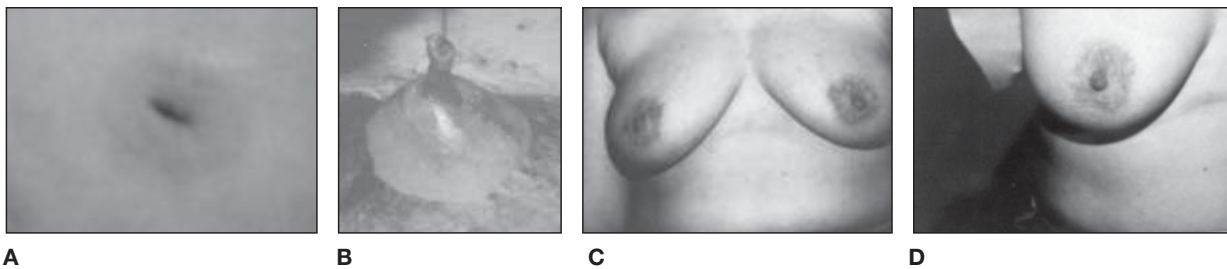
**INTRODUCTION:** The condition of inverted nipple was first described over 160 years ago. Since then a number of conservative and over 60 surgical techniques have been described for its correction. The large number of techniques and modifications proposed over the years demonstrate that the ideal solution for correction of this condition has not yet been found. We present a new technique for management, based on the observation that Grade III nipple inversion is due to shortness of the ducts, but also to skin deficiency around the nipple.

**TECHNIQUE:** The procedure is performed under local anesthesia. We use traction of the nipple with a fine hook and make a circumferential incision around the base of the nipple. Extensive and careful superficial undermining with blunt scissors under the areola follows this step. The ducts, the sensory and vascular supply to the nipple are left

intact. As the nipple is pulled forward with the hook a 0.6–1 cm skin defect is created around it. An oval shaped, full-thickness skin graft is then harvested from the 3 or 9 o'clock position of the areola, extending from its margin to the base of the nipple. The skin graft is sutured around the defect of the nipple with interrupted absorbable sutures while the donor site defect is closed without tension. The skin graft is secured in position with a tie-over dressing (Fig.1 A-B).



**RESULTS:** We used this technique in five women age 26–34, with Grade III bilateral nipple inversion. Our follow-up ranged from two to seven years. There were no immediate or late complications, or recurrences; the nipples maintained their immediate post-operative length and adequate projection (Fig. 2). No loss of sensation or erectile function was observed in any patient. The shape of the areola was not distorted and all scars were inconspicuous and barely visible. Three patients, who became pregnant after the procedure, were able to breast feed without problems.



**Figure 2.** (A) Grade III nipple inversion. (B) Five years after the procedure adequate projection is maintained. Minimal scarring in the areola is noted.

**DISCUSSION:** Han<sup>1</sup>, classified the inverted nipple according to the possibility of pulling it out, as follows: Grade I, when the nipple can be easily pulled manually and maintain its projection without traction. Grade II, when the nipple can be manually pulled out but not easily, and it has the tendency for retraction; and Grade III, when the nipple is severely inverted and retracted. In these cases, it is virtually impossible to pull the nipple out. There is universal agreement that the ideal technique for correction of inverted nipples should combine the following: Nursing ability, inconspicuous scars, long-lasting results, preservation of nipple sensation and lack of complications or unfavorable results. Existing surgical techniques can be roughly categorized in three groups: The “tight neck technique” with attempt to correct the deformity by placing various designs of purse string sutures around the base of the nipple; the duct cut techniques, and the augmentation techniques based with the assumption that the cause of inversion is lack of support beneath the nipple. All techniques can produce average to excellent results with variable rate of recurrence. Our technique is based on the observation that in Grade III inversion there is lack of adequate amount of skin around the nipple in addition to the well accepted shortness of the ducts.

**CONCLUSIONS:** Further investigation will be necessary with a much larger sample of patients. Based on our experience however, we believe that our technique is very useful for the management of Grade III inversion. It is simple, respects the anatomy of the area and results in adequate and permanent projection of the nipple, without loss of sensation or erectile function. There is perfect color match of the graft with the surrounding tissues and the scars are inconspicuous. Full nursing ability is possible.



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## P37: Immediate Skin Grafting of an Engineered Dermal Substitute

**Claire Sanger, DO; Joseph A. Molnar, MD, PhD; Chad E. Newman, MD; Christopher A. Park, MD; Stanley E. Gordon, BS; Jordan Simpson, BS; Dean DeRoberts, MD; Michael J. Morykwas, PhD**

**PURPOSE:** The synthetic dermal regeneration template, Integra (Integra Life Sciences, Inc., Nutley, N.J.) is currently used in a two-stage procedure to allow vascularization of the matrix prior to placing a skin graft. If this could be performed as a one-stage procedure, it would result in less surgery for patients, a significant cost savings, and ultimately less morbidity to the patient. Sub-atmospheric pressure treatment (V.A.C., K.C.I., Inc., San Antonio, TX) has improved blood flow to wounds, accelerated Integra incorporation in complex tissue defects, and is a dressing used for skin graft procedures. We hypothesized that applying this device to the dermal matrix with immediate skin grafting should allow one-stage vascularization.

**MATERIALS & METHODS:** Three separate full-thickness wounds were created on the dorsum of six pigs. The wounds were covered with (A) split thickness skin graft (STSG) alone, (B) Integra dermal regeneration template (without silicone) plus STSG, or (C) Integra matrix wound dressing plus STSG. The Integra and skin graft were meshed 1:1 and treated with subatmospheric pressure. Dressing changes were performed at 7, 10, and 14 days. At these intervals, tissue biopsies were obtained. Percent engraftment was determined by digital planimetry and blood flow was assessed using scanning laser doppler.

**RESULTS:** The subatmospheric pressure treatment of Integra with immediate skin grafting resulted in comparable engraftment to the control group. Percent engraftment for both the Integra dermal regeneration template (85.38% +/- 9.88) and matrix wound dressing (75.69% +/- 24.22) yielded results equal to skin grafting alone (83.52% +/- 26.11). These values were not significantly different from the control group ( $p=0.95$  for Integra and  $p=0.45$  for the matrix wound dressing). Blood flow was significantly greater in the wounds covered with Integra compared to the control group ( $p<0.02$ ).

**CONCLUSIONS:** In most situations it is important to obtain wound coverage in a timely manner for a more physiological healing process to occur. Reaching this goal with success is often difficult. Single-stage application of a split thickness skin graft over a dermal regeneration template has engraftment rates similar to skin graft controls in this animal model. This study provides the basis for clinical evaluation of the one-step procedure in the treatment of full-thickness wounds thus achieving more rapid and still successful wound coverage.

This paper was presented in part at the annual meeting of the American Burn Association, Chicago, Illinois, May 13, 2005.

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## P38: Implant-Based Breast Reconstruction In Elderly Women: Advantages and Outcomes

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**PURPOSE:** Almost half of all breast cancer patients in the United States are greater than 65 years of age. Although the majority survives their cancer more than 10 years, breast reconstruction is performed significantly less in older women. It is unclear whether this represents patient preference or physician bias. Few publications address breast reconstruction in the elderly, and those tend to be small series with varying complication rates that encompass all

forms of reconstruction. The objective of this study was to review a single cancer center's 12 year experience with implant based breast reconstruction in this age group.

**METHOD:** A retrospective study of all mastectomy patients aged 65 and older who underwent two-stage tissue expander (TE) and implant breast reconstruction between April 1993 and December 2004 was performed. Parameters evaluated included: timing and laterality of reconstruction, chemotherapy and radiation administration, medical and smoking history, length of operation, incidences of contralateral balancing procedures and nipple-areolar (NAC) reconstruction, hospital stay and time to complete reconstruction. Complications and outcomes were analyzed.

**RESULTS:** The total number of mastectomies performed in women aged 65 and older during this time period was 1414. The overall reconstruction rate in this group was 11% as compared to 61% of patients under the age of 65 (Table 1). The percentage of older women undergoing breast reconstruction significantly increased in the second half of the study from 6% to 15% (Table 2). In 132 patients (92%), implant reconstruction was performed. A total of 150 tissue expanders (92% immediate, 86% unilateral) and 138 implants (85% saline) were placed. The mean age was 69 (range 65-80) with a mean follow-up period of 37 months (range 2-120). Chemotherapy was administered to 35% of patients and 20% received radiation. A 70% incidence of preoperative comorbid conditions was noted. Operative time for unilateral mastectomy and tissue expander insertion averaged 208 minutes (bilateral: 270) and delayed procedures 112 minutes. Unilateral permanent implant exchange averaged 105 minutes (bilateral: 155). Contralateral symmetry procedures were performed on 50% and 18% chose NAC reconstruction. Average hospital admission for reconstruction was 2.8 days. Mean interval to completion of reconstruction was 222 days (range 58-685).

There was only one major medical complication (pulmonary embolus) and no mortalities. Overall, 88% of reconstructions were successful. Salvage reconstruction with autologous tissue was performed in 3 (19%) cases of reconstruction failure. The collective reoperation rate was 11 % (revisions comprised one-fourth and treatment of complications three-fourths). On multivariate analysis, no patient characteristic or comorbid condition was significantly associated with reconstruction failure. Complications and outcomes are listed in Table 3.

**CONCLUSIONS:** Two-stage implant breast reconstruction is a safe and effective option for the elderly patient. Anesthetic times and hospital stays are acceptably brief. Most complications are minor and occur more often after TE insertion than with implant exchange. The majority of early complications are related to mastectomy flap necrosis or infection. Later, implant contracture is the most frequent problem. Patients elected contralateral balancing procedures more than twice as often as NAC reconstruction, which may suggest that symmetric breast mounds completed a satisfactory reconstruction in most elderly patients. In spite of a high incidence of comorbid conditions, the vast majority of patients underwent uncomplicated, successful reconstruction. Further study is needed to determine the factors responsible for the lower incidence of breast reconstruction in the elderly.

**Table 1.** Institution's Breast Reconstruction Experience (1993-2004).

Patient Age	Mastectomies Performed	TE/Implant Reconstructions (n)	Autologous Reconstructions (n)	Patients Reconstructed
>65 years	1414	92% (139*)	8% (13)	11%
<65 years	5183	84% (2598)	16% (552)	61%

\*7 patients awaiting permanent implant exchange

**Table 2.** Institution's Elderly (> 65) Breast Reconstruction Rate.

Time Period (12 yr. experience)	Average Mastectomies Performed	Average TE/Implant Reconstructions	Average Autologous Reconstructions	Average % Patients Reconstructed
1993-1998	111.5/yr	5.9/yr	0.8/yr	6%
1999-2004	125.7/yr	17.4/yr	1.3/yr	15%

**Table 3.** Complications and Outcomes Summarized.

Complications and Outcomes	Stage 1 TE Placement	Stage 2 Implant Placement	Stage 2 Contralateral Procedures	Stage 3 NAC Recon
Hematoma	2.7%	0	0	0
Seroma	2.7%	0	0	0
Skin Necrosis	10%	0	4.3%	5.3%
Infection*	7.4%	2.2%	0	0
Leak	0.7%	2.2%	N/A	N/A
Contracture (III/IV)	N/A	14%	N/A	N/A
Reoperation**	12%	9%	4.4%	15.8%
Premature Device Removal	7.3%	8%	N/A	N/A

\*Requiring IV antibiotics, \*\* Revisions accounted for 25% of reoperations.

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## P39: Joint Flaps for Nasal Tip and Alar Reconstruction

Glenn E. Herrmann, MD; Ramasamy Kalimuthu, MD

A cosmetically-acceptable resurfacing the nose after tumor extirpation or traumatic tissue loss can be a challenging undertaking. Dieffenbach first popularized the Nasolabial flap in 1846<sup>1</sup>, and since then several methods of repair have been described.<sup>3-5</sup> Drawbacks to these flap designs include flattening of the nasolabial fold, alteration of the alar groove anatomy and an inherent requirement for staged operations. The use of rotation and advancement flaps for resurfacing small surgical defects of the nasal tip and ala deserves reappraisal. The rich and arborizing blood supply of the nose and cheeks allows for the engineering of numerous flaps based both on the subcutaneous and dermal plexuses as well as the myocutaneous perforating arteries of the region.

We describe a new local flap grouping which combines a local Banner flap and the nasolabial flap described by Elliott and Dieffenbach.<sup>1,2,6</sup> The first action is a 90-degree rotation of a donor flap to fill a recipient defect, followed by a V-Y advancement of a second portion of the flap to fill the defect created by the rotation of the first (Figures 1-4).

**INTRODUCTION:** It is well-known that the prominence of the nose subjects its integument to an abnormal amount of trauma and irritation, accidental injury and malignant infiltration. The harmony of the osteocartilagenous foundation with finely-draped skin allows for an aesthetically pleasing yet highly functional

anatomic facial structure. When tumor extirpation or traumatic tissue loss affects the nasal tip and ala, correction of the defect to achieve the best cosmetic result is certainly favorable. Small defects are obviously best handled by excision and primary closure, but larger defects historically require rotation or advance of local tissue or the use of free grafts. In general, local tissue is most desirable because of its similarity of texture and color to the tissue it is to replace.<sup>3</sup>

Free full or split-thickness skin grafts often introduce dissimilarities not only in texture and color, but also in contour. Local tissues, used as a pedicle flap, can overcome these handicaps. A cosmetically-acceptable resurfacing of the nasal tip and ala can be a challenging undertaking, and multiple reconstructive options have been presented in the literature over the past 150 years. The area of the cheek is perfused by the angular, nasolabial, transverse facial and internal maxillary arteries. The arborizing vascular anatomy of the nose and cheek has been documented<sup>3,4,5</sup> and allows flexibility with flap engineering. The Joint flap is based mostly on the lateral nasal and external nasal arteries.

Herbert noted in 1975 that the skin of the nasolabial region is ideal in color and texture for nasal reconstruction, but rotation flaps pulled the reconstructed ala laterally, the nasolabial fold becomes flattened, and the reconstructed ala can be too thick. Secondary operations were required to maximize cosmesis.

**METHODS:** This is a retrospective review of 25 patients between 2000 and 2005. A single surgeon's reconstruction of nasal tip and alar defects is presented. The flap combination serves to resurface defects on the nasal tip and ala without flattening the nasolabial fold or erasing the alar groove. There was no flap loss, 2/25 (8%) patients experienced minor wound infection requiring antibiotic therapy, 2/25 (8%) flaps required a subsequent defatting procedure to maximize cosmesis, and 1/25 (4%) developed a suture reaction requiring removal of the suture.

**DISCUSSION:** The Joint Flap described in this article is designed to minimize donor site deformity during reconstruction of alar and nasal base defects. The term, "Joint Flap" developed, because the excursion of these two concordant flaps simulates that of a hinge joint. The first action is a 90 degree rotation of a donor flap to fill a recipient defect, followed by a V-Y advancement of the proximal portion of the attached flap to fill the defect created by the rotation of the first (Figure 1-4). Each flap section has a different blood supply. The blood supply to the distal rotated portion is based on the dermal plexus and subcutaneous perforating vessels, while the arterial supply to the proximal V-Y advancement portion is based upon the myocutaneous perforators as an axial flap.

When the nasolabial flap<sup>5</sup> is rotated toward a nasal defect, the donor area is repaired primarily, or with a different local flap or skin graft. Historically, the distal portion of this flap may need to be trimmed to fit the recipient site, because we design the donor flap three times longer than the width of the pedicle, to assist with primary closure of the donor defect. However, primary closure of the resultant defect may cause a deformity, notably a flattening of the nasolabial fold. The Joint Flap addresses this issue by redistributing the skin tension in the region through advancement of a second local flap from the cheek. The nasolabial surface anatomy is unadulterated.

The Joint Flap has advantages over previous flap designs. The nasolabial fold is preserved. Skin tension is redistributed to avoid flattening and break-down of the donor area due to skin tension. Lastly, no tissue is discarded, but utilized to perfectly correct the initial deformity and the subsequent donor site tissue deformity.



Figure 1.

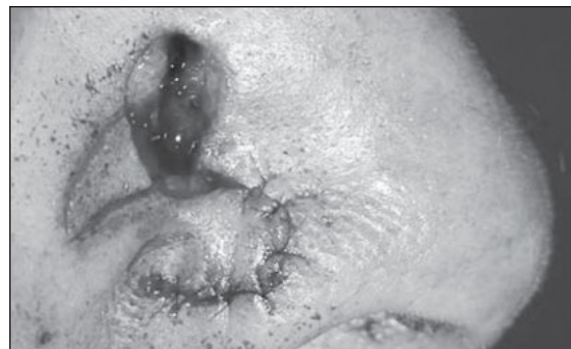


Figure 2.





Figure 3.



Figure 4.

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## P40: LED Light Treatment: Clinical (Pre)Treatment For Surgery, Cancer, and Skin Cancer

*Denis F. Branson, MD*

In recent years, LED light systems have become available in a variety of wavelengths. This paper represents my personal experience in 533 treatments over the period of 1 January 04 to 31 December 04. Treatments were performed with the Omnilux 417nm (blue), 633 nm (red), or 830 nm (near infrared).

**Breast Capsule: Augmentation, Reconstruction, & Tissue Expansion** – Five of five patients treated with either 633 nm (red) alone, or 830/633 nm combined therapy once weekly for a minimum of 3 treatments. Patients saw changes in implant hardness within 10 days of the first treatment. Capsular contracture was reduced from Baker III-IV to Baker I-II.

**CO<sub>2</sub> Laser Resurfacing: Pre-treatment** – Patients undergoing laser resurfacing received 3 treatments before resurfacing, using either 633nm or a combination of 830/633nm. Three 633nm (once weekly) treatments were administered after re-epithelialization. All patients were treated using the Sharplan Feathertouch system, using 3 passes of 120 watts. Where previous patients required 10-20 days to heal, pre-treated patients were epithelialized in 6-7 days. Erythema at 3-4 weeks was comparable to previous patients at 3-4 months. One male smoker experienced resolution of erythema within ~4 weeks. Upper and lower eyelids resurfaced at 80 watts were epithelialized within 4 days.

**Hair Removal: Post-IPL treatment** – Immediately following IPL hair treatment, 2 maintenance hair removal patients were treated with 633nm lite. Both noted improved hair reduction that previously experienced.

**Fat Graft Survival: Pre-treatment** – While the results of *any* fat injection treatment can be variable, of the treated patients, it was my clinical impression that both the short term edema was reduced/abbreviated and fat graft survival was enhanced at ≥ 3-6 month follow-up. Three weekly pre-treatments of 633 nm or 830/633 nm combined treatments were performed, with three weekly 633 nm treatments starting at the 1 week recheck visit.

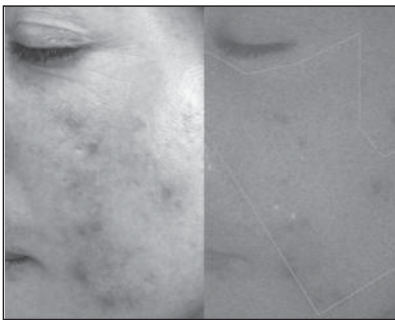
**Skin Rejuvenation/Basal Cell Cancer/Actinic Keratosis: Photo-Dynamic Therapy (PDT)** – Using Visia® complexion analysis, the extent of sun damage was documented. Lite treatments were done with either the 633 nm or 417 nm lite. For bilateral treatment, both 417 & 633 nm lights were used. Clinical response was equally to both wavelengths. Discomfort during light exposure was higher for the 417 nm light.

Skin texture improvements were observed over the 3 months, with the greatest change occurring in the first month. Patients undergoing PDT for aesthetic reduction of sun damage (who did not see significant improvement in Visia® analysis) still reported subjective improvement in enhanced skin softness, elasticity, and make-up retention/stability.

**830/633 nm Skin Rejuvenation** – A series of 12 patients underwent a sequence of individual 830 nm or 633 nm treatments over 5 weeks. Smokers were excluded. Pre-, intra-, and post- sequence Visia® complexion analysis was performed. Texture improvements were greater in the thinner peri-orbital skin, and less pronounced in the peri-oral area. Continued texture improvements were observed for up to three months after the last treatment.

Patients who underwent 830/633 treatments following PDT (≥ 3 months after PDT) saw better texture improvement. This would suggest a potential benefit of PDT as a pre-operative treatment (to enhance skin elasticity following any skin treatment).

**Acne: LED only or PDT** – For some patients with cystic acne, Visia® documented low porphyrin counts. This suggests either a deficit in drainage, an imbalance in immune response, or both. For cystic acne, PDT treatment appears to facilitate porphyrin drainage. Treatment with either 633 nm alone, or with the 830 nm can stimulate self-repair, facilitating cyst resolution, even in patients showing resistance to Acutane.



**Figure 1.** Visia: Low porphyrin (bacteria) cystic acne.



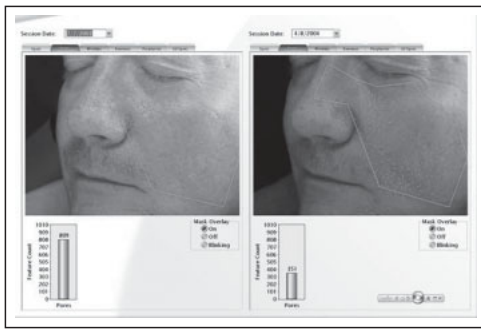
**Figure 2.** Pre & Post PDT acne treatment.



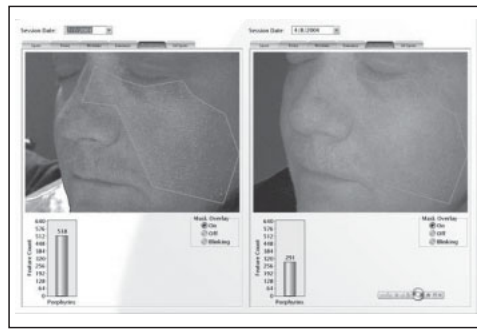
**Figure 3.** 830/633nm Pre/Post Treatment for high energy CO<sub>2</sub> Resurfacing (smoker).



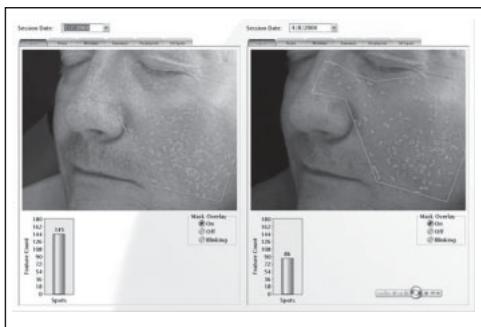
**Figure 4.** 633nm Pre/Post Treatment for high energy CO<sub>2</sub> Resurfacing.



**Figure 5.** Visia (Pores) Pre/Post PDT 10% for Texture.



**Figure 6.** Visia (Porphyrins) Pre/Post PDT 10% for Texture.



**Figure 7.** Visia (Spots) Pre/Post PDT 10% for Texture.



**Figure 8.** Pre/Post PDT 10% for Texture.

## **P41: “Mapping the Gap”: Combined Histologic and $\mu$ CT Assessment of Bone Healing During Mandibular Distraction Osteogenesis**

**Daniel Adam Schwarz, MD; Ayman Elmeligy, MD; Krikor G. Arman, BA; Michael J. Plakke; Steven R. Buchman, MD**

**INTRODUCTION:** Despite the increasing clinical use of distraction osteogenesis (DO) of the mandible, the temporal and spatial sequence of bone healing during DO remains poorly understood. A better understanding of the timing, location and degree of healing within the regenerate will be a key component in defining the overall quality of DO and may help to reveal the underlying mechanisms of mechanically induced new bone formation. Our specific aim is to determine the sequence of events leading to healing of the distraction regenerate while mapping the pattern of mineralization within the gap.

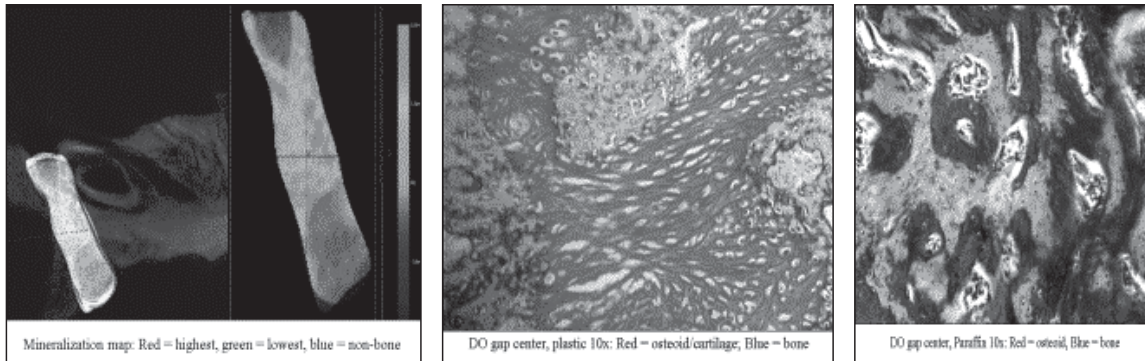
**METHODS:** A modified Ilazerov-type external fixator was placed bilaterally in 400g male Sprague–Dawley rats. A unilateral vertical osteotomy was placed posterior to the 3rd molar. DO: 4-day latency with 5.1mm total gap and C: contra-lateral mandible as control. All animals underwent 28 days of consolidation. Calcein Green and Xylenol Orange were injected IP after latency (POD 5) and distraction (POD 13), respectively; Post-euthanasia, hemi-mandibles were fixed in 70% ETOH and stored away from light.

**Imaging:** Using  $\mu$ CT (GE Healthcare Biosciences), mandibles were scanned at 45micron voxel size. Regions of interest (ROI) were created using anatomic landmarks and matched with prior templates, using beta test software version with advanced ROI abilities. Alpha-blend imaging was performed using 256 colorimetric grayscale.

**Histology:** Plastic (PMMA) embedding into blocks by dehydration/infiltration under vacuum oven. I) Sagittal sections were cut (Exakt), micro-grounded to 200 $\mu$ m, polished and mounted; II) 5 $\mu$ m sagittal sections cut (Polycut), mounted, and then stained with modified Movat’s, Gomori and Toluidine Blue for plastic. Additionally, 10 $\mu$ m paraffin sections (de-calcified) from prior group (identical surgical protocol) were stained with Gomori’s trichrome. We used a smaller ROI on Bioquant® software, directly proportional to  $\mu$ CT, which only measured the central

region, rather than the entire gap. Measures included tissue volume (TV); bone volume (BV) and osteoid volume (OV), then calculated BV/TV and OV/TV. Independent t-tests were used to compare DO parameters.

**RESULTS:** DO histology revealed a centralized cartilage and osteoid intermediary, with inward growth of a canal-like pattern of woven bone. Surprisingly, we found islands of osteoid and bone scattered throughout the gap, rather than from the periphery.  $\mu$ CT alpha-blend revealed a similar scattered pattern of various low to high mineralization color peaks throughout the gap. Xylenol Orange supported this with a scattered fluorescence throughout the DO gap. The ratio of BV/TV compared to OV/TV ratio was not significantly different in our DO regenerate.



**CONCLUSIONS:** We have determined and outlined the sequence of healing within the distraction regenerate as well as created a  $\mu$ CT derived alpha-blend map of the gap. The degree of non-mineralized matrix to bone ratio within the center of the DO gap, despite clinical evidence of bony union, suggests deposition is ongoing and that scattered patterns of bone healing are integral to the mechanism of DO. The use of newer  $\mu$ CT algorithms mapping mineralization within the distraction gap is supported by light and fluorescent microscopy. Mapping the DO gap should improve our ability to evaluate the quality of bone healing within the regenerate and enable us to establish the most advantageous treatment protocols to promote the best possible formation of new bone.

#### **P42: Melanoma of Thumb: Retrospective Study of 15 Cases for Amputation Levels, Surgical Margin and Reconstruction**

*Hiroshi Furukawa, MD; Arata Tsutsumida, MD; Yuhei Yamamoto, MD; Satoru Sasaki, MD; Mitsuru Sekido, MD; Tsuneki Sugihara, MD; Tetsunori Yoshida, MD; Hidehiko Minakawa, MD; Ichiro Kokubu, MD*

**BACKGROUND:** The treatment for melanoma of thumb is challenging field, because surgeon has to overcome both poor prognosis and reconstruction after the varying length and volume of the lost thumbs. Very few papers have reported reconstruction of the amputated thumbs for this disease<sup>1</sup>. In this article, we present our 15 cases of melanoma of thumb and analyzed their Stage, surgical margin of skin and amputated level, reconstruction, and their prognosis retrospectively.

**PATIENTS AND METHOD:** 15 patients underwent primary excision and reconstruction for thumb melanoma between 1986 to 2004 at Hokkaido University School of Medicine, Department of Plastic and Reconstructive of Surgery. The patients were reviewed to evaluate the prognostic significance of variables including the following: age and sex of the patient, tumor thickness, staging by the 2002 version of American Joint Committee on Cancer staging system for cutaneous melanoma<sup>2</sup>, level of amputation, and excision margin. Our 15 cases were divided into two groups according to amputation level (MP or IP) and surgical margin (less than 3cm or more than 4 cm) and prognosis were analyzed statistically. The relationships between various characteristics and outcomes were investigated separately with disease free survival curves estimated using the Kaplan Meier. The statistical significance of the difference between curves was determined using log-rank test.

**RESULTS:** 8 of the 15 patients were men, and median age is 55 years (range = 44 to 77 years). 6 patients had presented Stage I disease, 4 patient had presented Stage II disease, and 5 patients had presented Stage III disease.



Mean follow-up period was 74 months (range = 3 to 163 months). 8 patients were continuously disease free, 3 patients were alive with disease, 3 patients were dead of melanoma, and 1 patient was dead of other disease. Recurrence was noted in 1 case in which excision margin was 1cm. The results of univariate analyses of factors affecting patient disease free survival are presented in Table 1. The stage and thickness were identified as prognostic factors for disease free survival, however, the level of amputation and excision margin were not identified as prognostic factors. Amputated thumb was reconstructed by pollicization in 8 cases, free toe to thumb in 2 cases, reverse forearm flap in 2 cases, local flap in 2 cases, skin graft in 1 case. No major complication of reconstructed thumb occurred. 7 of 8 cases of MP amputation were reconstructed by pollicization. The other hand, 5 cases of IP amputation were reconstructed by volar skin flap in 2 cases, reverse forearm flap in 2 cases, and trimmed 1st toe transfer in one case.

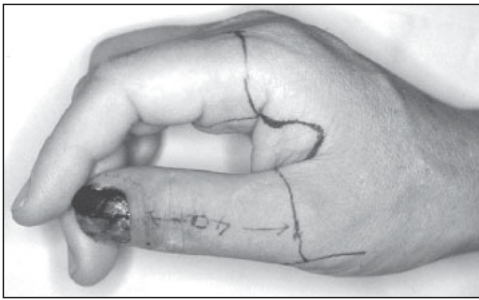
**CASE REPORT:** Case #7; A 55-year-old man suffered a melanoma in his right thumb, thickness 1.8 mm, Stage II. Amputation was performed MP joint with 4 cm excision margin. Pollicization of his index finger was performed for reconstruction (Fig.1, 2). He survived for 108 months with continuous disease free.

Case #2; A 55-year-old man suffered a melanoma in his left thumb, thickness 2.7 mm, Stage III. Amputation was performed IP joint with 2 cm excision margin. Trimmed 1st toe transfer was performed for reconstruction (Fig. 3, 4). Lymph node dissection after sentinel lymph node biopsy was performed. He survived for 12 months and he is alive with lung metastasis.

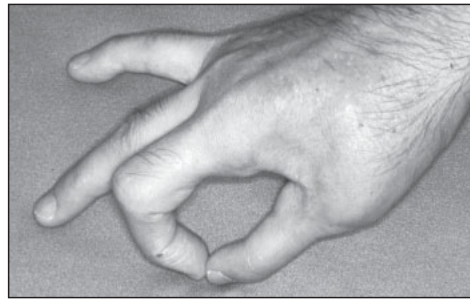
**Table 1.** Survival and Characteristics of Patients with Melanoma of Thumb.

Characteristic	Number of Patients (Total n=15)	Disease Free Survival (p-value)
Age		
>60	4	0.4357
≤60	11	
Sex		
Male	8	0.3864
Female	7	
AJCC stage		
I and II	10	0.0002
III	5	
Tumor thickness		
≤ 2.0mm	9	0.0138
2.0mm <	6	
Amputation level		
IP	5	0.3012
MP	9	
Exisional margin		
≤ 3cm	6	0.7954
4cm ≤	9	

**CONCLUSION:** Most of recent randomized trials, delineating what specific margin is safe in melanoma, excluded subungual melanoma cases. Several reports, that noted the level of amputation did not affect incidence of local recurrence or patient survival in subungual melanoma, did not focus on thumb, but they included all finger and toe. In our study focusing on melanoma of thumb, IP amputation and 15-30mm margin did not compromise disease free survival, and contributed the increased choice of reconstructive tools, especially in local flaps and free toe to thumb transfer.



**Figure 1.** Pre-operative view in case #7. Amputation was performed at MP joint and excision margin was 4cm.



**Figure 2.** Post-operative view in case #7. Thumb was reconstructed by pollicization using index finger.



**Figure 3.** Pre-operative view in case #2. Amputation was performed at IP joint and excision margin was 2cm.



**Figure 4.** Post-operative view in case #2. Thumb was reconstructed with free trimmed 1st toe transfer.

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## P43: Microvascular Breast Reconstruction Using Buttock Tissue: The Preferred Scar Location and Shape

*Kelly L. Babineaux, MD; Jay W. Granzow, MD, MPH; Erin Bardin, BS; Elorice Horam, BS; Joshua L. Levine, MD; Robert J. Allen, MD; Ernest S. Chiu, MD*

### ABSTRACT

**BACKGROUND:** When abdominal tissue is not available, the buttock is a potential donor site for microsurgical breast reconstruction. Superior gluteal artery perforator (S-GAP) and inferior (“In the Crease”) gluteal artery perforator (I-GAP) flaps can be performed with equal success. The final buttock scar and shape differ depending on flap harvest donor site. The goal of this study is to determine the preferred postoperative donor buttock scar location and shape.

**MATERIALS & METHODS:** A survey was designed and distributed for research participants to complete. A short slide presentation was given, which included examples of preoperative and postoperative results. Participants were asked to evaluate postoperative donor buttock scars and shape after gluteal artery perforator flap harvest. Reconstructive goals, outcomes, preferred buttock scar location and shape, acceptable operative and recovery time, and preferred donor sites were all evaluated.

**RESULTS:** 162 participants enrolled in this survey. First, they ranked in order the factors important for successful breast reconstruction. The most to least important factors were as followed: final breast shape, final body aesthetic

shape, final breast texture “natural feel,” final donor site scar, quick recovery, and short operation. When evaluating gluteal donor scars, 73% of the participants preferred the I-GAP donor site scar location, 11% preferred the S-GAP donor site scar location, and 16% had no preference. When evaluating gluteal donor shape, 49% of the participants preferred the I-GAP donor site buttock shape, 27% preferred the S-GAP donor site shape, and 24% had no preference. When evaluating operative time, 32% of participants would consider this surgical technique if the operative time was 4 hours, 28% if the operative time was 8 hours, 7% if the operative time was 12 hours, while 30% of the participants did not feel the operative time was important. 4% would not consider this breast reconstruction technique regardless of operative time. When evaluating recovery time, 26% of participants would consider this breast reconstruction technique if recovery time was 3 days, 20% if recovery time was 5 days, 10% if recovery time was 7 days, while 37% of the participants did not feel recovery time was important. 7% would not consider this technique regardless of recovery time. If given the choice between abdominal and buttock donor sites for breast reconstruction, 46% of the participants chose the abdomen, while 34% and 20% chose I-GAP and S-GAP donor sites, respectively. Abdominal tissue was preferred because the scar was less visible and the overall body shape was better.

**CONCLUSIONS:** If buttock tissue is used to reconstruct a breast, the majority of survey participants prefer both the *postoperative I-GAP buttock scar location and shape*. However, the abdomen remains the preferred donor site when all flap donor sites are available. The participants of this survey felt the most important determinants in successful breast reconstruction outcome are final breast shape, final body aesthetic shape, and final breast texture “natural feel,” respectively. Operative and recovery time are less important in patient decision making for breast reconstruction.

**INTRODUCTION:** For women diagnosed with breast cancer who must undergo mastectomy, breast reconstruction provides a way to restore normal contour to the female figure. There are many more options today than when breast reconstruction first began in the 1970s. Perforator flaps are the most advantageous flaps due to the fact that they only require resection of skin and the underlying fat without injury to the musculature. The postoperative recovery is much less painful and there is no loss of function. The newest perforator flaps are the gluteal artery perforator flaps, which use buttock skin and subcutaneous tissue to create a breast. When abdominal tissue is not available, the buttock is a potential donor site for microsurgical breast reconstruction. Superior gluteal artery perforator (S-GAP) and inferior (“In the Crease”) gluteal artery perforator (I-GAP) flaps can be performed with equal success. The final buttock scar and shape differ depending on flap harvest donor site. The goal of this study is to determine the preferred postoperative donor buttock scar location and shape.

**MATERIALS & METHODS:** A survey was designed and distributed for research participants to complete, who were predominantly first and second year medical students. The survey began with demographic information, then past surgical history, and finally, five specific questions pertaining to breast reconstruction using gluteal artery perforator flaps. A scenario in which a woman could only use buttock tissue for breast reconstruction was first presented. The research participants then had to decide which factors were most important in deciding the type of breast reconstruction. A series of pictures of preoperative and postoperative results using both superior and inferior gluteal artery perforator flaps for breast reconstruction were shown and then the participants had to choose their preference in terms of scar and shape. Operative and recovery time were also considered, comparing preference for shorter versus longer operations and recovery in decision making to have breast reconstruction. The final question factored in abdominal tissue as a donor site option along with an inferior or superior buttock flap and the preference for one versus the other.

**RESULTS:** Of the 162 participants enrolled in this survey, 68% were ages 20 to 25, 23% were ages 26 to 30, 6% were ages 31 to 35, and 1% were ages 36 years and older. 54% were female and 46% were male. The average weight of all the participants was 155 pounds. The majority (78%) were of the Caucasian race, with only 11% remaining with an ethnic background of either Asian or African American. All participants were college graduates, with the majority currently in medical school. 46% of participants had an income less than 20,000 dollars. For marital status, the majority at 78% had never been married, with only 19% currently married, and 1% divorced. 63% had no children, and 22% had children with ages less than 5 years. Most of the participants lived in New Orleans. 58% had previous surgery with 47% reporting a good experience, 51% reporting an ok experience, and 2% reporting a bad experience. 59% knew someone with breast cancer and 51% knew someone with breast reconstruction, however

73% of these participants reported implant versus 27% who reported own tissue as type of reconstruction performed. 80% of participants reported that those who had breast reconstruction were satisfied, with only 1% unsatisfied with their results. None of the participants had personally had breast cancer, nor had they undergone breast reconstruction. When ranking factors important for successful breast reconstruction, the most to least important factors were as followed: final breast shape, final body aesthetic shape, final breast texture “natural feel,” final donor site scar, quick recovery, and short operation. When evaluating gluteal donor scars, 73% of the participants preferred the I-GAP donor site scar location, 11% preferred the S-GAP donor site scar location, and 16% had no preference. When evaluating gluteal donor shape, 49% of the participants preferred the I-GAP donor site buttock shape, 27% preferred the S-GAP donor site shape, and 24% had no preference. When evaluating operative time, 32% of participants would consider this surgical technique if the operative time was 4 hours, 28% if the operative time was 8 hours, 7% if the operative time was 12 hours, while 30% of the participants did not feel the operative time was important. 4% would not consider this breast reconstruction technique regardless of operative time. When evaluating recovery time, 26% of participants would consider this breast reconstruction technique if recovery time was 3 days, 20% if recovery time was 5 days, 10% if recovery time was 7 days, while 37% of the participants did not feel recovery time was important. 7% would not consider this technique regardless of recovery time. If given the choice between abdominal and buttock donor sites for breast reconstruction, 46% of the participants chose the abdomen, while 34% and 20% chose I-GAP and S-GAP donor sites, respectively. Abdominal tissue was preferred because the scar was less visible and the overall body shape was better.

**CONCLUSIONS:** With the advances made in breast reconstruction with perforator flaps, more women are choosing to have autologous breast reconstruction; therefore, it is important to have multiple appealing options from which to choose as a donor site. The use of buttock tissue to create a breast is a relatively new option and very advantageous when the abdomen is not available for use in breast reconstruction. If buttock tissue is used to reconstruct a breast, *the majority of survey participants prefer both the postoperative I-GAP buttock scar location and shape.* However, the abdomen remains the preferred donor site when all flap donor sites are available. The participants of this survey felt the most important determinants in successful breast reconstruction outcome are final breast shape, final body aesthetic shape, and final breast texture “natural feel,” respectively. Operative and recovery time are less important in patient decision making for breast reconstruction.

**References**

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**Graph 1 (a, b).** Gluteal artery perforator flaps for microsurgical breast reconstruction survey results (n=162 participants)  
**(a)** The preferred postoperative buttock scar **(b)** The preferred postoperative buttock shape

