The Midwestern Association of Plastic Surgeons

The Midwestern Association of Plastic Surgeons
In Conjunction with Chicago Medical Society

CHICAGO MEDICAL SOCIETY

Presents

54th Annual MAPS Meeting

"Discovery in Plastic Surgery"

Saturday, May 30, 2015

Northwestern Memorial Hospital
Feinberg Pavilion – 3rd Floor Conference Center
251 East Huron Street
Chicago, Illinois

Message from the Program Chair

The Midwestern Association of Plastic Surgeons (MAPS) is extremely pleased to partner with the esteemed editors of the *Annals of Plastic Surgery*, Dr. William A. Lineaweaver and Ms. Yongue Jane Wood, to bring you the inaugural issue of our supplement for the 54th Annual MAPS meeting. We are delighted to highlight the innovations and research advances of the plastic surgery institutions throughout the Midwest. This year we received an unprecedented number of submissions featuring superlative basic science and outcomes research in our region in all areas of plastic surgery: Peripheral Nerve, Tissue Regeneration and Signaling; Cosmetic; Breast; Microsurgery; Craniofacial; General Reconstruction; and Hand and Extremity. Our scientific committee rigorously reviewed all abstracts to select the best science that represents our geographical area. We have put together a remarkable scientific program and paired internationally and nationally known speakers in Rhinoplasty, Body Contouring, Face Transplant and Gender Reassignment to embrace "Discovery in Plastic Surgery," the theme for this year's meeting. We hope you find the *Annals of Plastic Surgery* Supplement an exciting addition to the 2015 meeting that provides an opportunity to expand your knowledge of ongoing, cutting-edge scientific research in the Midwest region.

Sincerely,

Anu K. Antony, MD, MPH, FACS
2015 MAPS Program Chair

Learning Objectives:

The Midwestern Association of Plastic Surgeons is committed to providing a comprehensive educational opportunity for plastic surgeons in practice and in fellowship or residency training, as well as medical students and other professionals involved in the care of plastic surgery patients. After participating in this educational meeting, attendees will be able to identify cutting-edge aesthetic technical improvements for the face and body, gain an awareness about advanced techniques in reconstructive plastic surgery including microsurgery innovations for the head and neck, and describe advanced techniques for gender reassignment surgery and the psychological aspects of transgender patients.

MAPS Officers 2015
Elected officers for MAPS 54th year are:

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Accreditation Statement

This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of the Chicago Medical Society and the Midwest Association of Plastic Surgeons. The Chicago Medical Society is accredited by the ACCME to provide continuing medical education for physicians. The Chicago Medical Society designates this live activity for a maximum of **8.25** ***AMA PRA Category 1 Credit(s)™***. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

The following planning members of the Chicago Medical Society's CME Committee have disclosed that they do not have any relevant financial relationships with any commercial interests: Ajay Chauhan, MD, Chairman, Howard Axe, MD, Loren Schecter, MD, Vickie Becker, MD, Adrienne L. Fregia, MD, Robert W. Panton, MD, Kathy Tynus, MD, and Haydee Nascimento, Director of Education.

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- 1962 John K. Grotting
- 1963 William C. Huffman
- 1964 James F. Dowd
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- 1966 Adrian E. Flatt
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- 1977 Harold J. Hoops, Jr.
- 1978 Gerald D. Nelson
- 1979 Richard C. Schultz
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- 1981 John P. Docktor
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- 1983 George S. Pap
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- 1985 Tommy E. Kendall
- 1986 Harold E. Harvey
- 1987 Elvin G. Zook
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- 1990 Robert W. Parsons
- 1991 William B. Webber
- 1992 Curtis Juhala
- 1993 Mimis Cohen
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- 1995 Albert E. Cram
- 1996 Arlen D. Denny
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- 2001 Victor L. Lewis, Jr
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- 2006 Julia Corcoran
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Exhibitors

MAPS would like to thank the following exhibitors for their participation:

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RTI Surgical Inc.
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Saturday, May 30, 2015

6:30am Registration & Breakfast
6:55am Welcome/ **Dr. John Hijjawi, MD**, President

Conference Room A	**Abstract Presentation Track I**	**Pritzker Auditorium**	**Abstract Presentation Track II**
7:00am – 7:45am	Peripheral Nerve, Tissue Regeneration and Signaling	**7:00am – 7:45am**	Craniofacial
8:00am – 8:45am	Cosmetic	**8:00am – 8:45am**	General Reconstruction
9:00am – 9:20am	Break	**9:00am – 9:20am**	Break
9:20am – 10:05am	Breast I	**9:20am – 10:05am**	Microsurgery/Hand & Extremity
10:20am – 10:45am	Breast II/Microsurgery	**10:20am – 10:45am**	Physician Expertise

The following programs are in Conference Room A:

10:50 -10:55am Remarks /**Dr. Anu Antony, MD, MPH**, Program Chair

10:55-11:05am *ASPS Update* /**Dr. David Song, MD, MBA**

11:05am -12:05 *Strategies in Body Contouring* / **Dr. Joseph Hunstad, MD**

12:15pm-12:30 *Group Photos*

12:30pm-1:30 Lunch /*Finding a Job After Residency* /**Dr. Paul Cederna, MD**

1:30pm-2:50 *Update in Face Transplantation*
Panelists: **Dr. Eduardo Rodriguez, MD & Dr. Maria Siemionow, MD**

2:50pm-4:00 *Rhinoplasty* /**Dr. Dean Toruimi, MD**

4:00pm-4:20 *Cocktails & Snacks*

4:20pm-5:45 *Gender Reassignment*
Panelists: **Dr. Bill Kuzon, MD, Dr. Paul Cederna, MD, Dr. Randi Ettner ,MD, and Dr. Larry Gottlieb, MD**
Moderator: **Dr. Loren Schechter, MD**

5:45pm-6:00 *President Closing & Awards*

Midwestern Association of Plastic Surgeons 2015: Abstracts

TRACK I: SESSION 1 PERIPHERAL NERVE, TISSUE REGENERATION AND SIGNALING

Abstract #1

Porous Silicone Substrate on Regenerative Peripheral Nerve Interface Demonstrates Suitability for Multi-Channel Electrodes

Jacob A. Mack, BSE[1], Shoshana L. Woo, MD[2], John P. Seymour, PhD[3], Xing D. Chen, BS[4], Euisik Yoon, PhD[3,4], Melanie G. Urbanchek, PhD[2], Paul S. Cederna, MD[2,4], and Nicholas B. Langhals, PhD[2,4]. [1]Medical School, [2]Section of Plastic Surgery, Department of Surgery, [3]Department of Electrical Engineering and Computer Science, [4]Department of Biomedical Engineering University of Michigan, Ann Arbor, MI, USA

OBJECTIVE: High-fidelity signals from the Regenerative Peripheral Nerve Interface (RPNI) are crucial for advanced prosthetic control and may improve with multi-channel electrodes on flexible polymer substrates like polydimethylsiloxane (PDMS). Substrate porosity may affect RPNI revascularization and regeneration. Therefore, we evaluated the viability of RPNIs encapsulated in PDMS of different porosities.
METHODS: 16 RPNIs consisting of an extensor digitorum longus muscle graft neurotized by a transected common peroneal nerve (CPN) were constructed in the rat hindlimb and divided into 4 PDMS substrate groups: 1) No PDMS (Control); 2) 50% porosity (PDMS-50%); 3) 25% porosity (PDMS-25%); 4) 0% porosity (PDMS-0%). At 3 months, peak-to-peak voltage (V_{PP}) and compound muscle action potential peak rectified area ($CMAP_A$) were measured from the RPNI after CPN stimulation. Two RPNIs per group were sectioned and stained with hematoxylin and eosin, Masson's trichrome, and von Willebrand Factor antibody. RPNI cross-sectional area (CSA), the number of myocytes in a representative 200x specimen, and mean myocyte CSA were calculated.
RESULTS: Histology demonstrated that Control, PDMS-50%, and PDMS-25% RPNIs contained healthy fibers; PDMS-0% RPNI fibers were greatly atrophied. Increased PDMS porosity resulted in (1) increasing RPNI CSA, (2) decreasing myocytes per high-power field, and (3) increasing myocyte CSA. The exception was PDMS-0%, with the fewest and the smallest myocytes. V_{PP} of PDMS-0% was less than Control, PDMS-50%, and PDMS-25%. $CMAP_A$ of PDMS-0% was also less than Control, PDMS-50%, and PDMS-0% (Table 1).

TABLE 1. Histologic and electrophysiologic results.

Group	RPNI CSA (mm^2)	Mean Myocyte CSA (μm^2)	Myocytes per 200x Field	V_{PP} (mV)	$CMAP_A$ (mV-ms)
Control	0.457	1621	293	2.79 ± 1.65 *	2.79 ± 1.62 †
PDMS-50%	0.299	956	357	2.93 ± 1.46 *	3.29 ± 1.69 *
PDMS-25%	0.338	826	427	2.21 ± 1.30 †	2.15 ± 1.36 †
PDMS-0%	0.009	32	86	0.297 ± 0.434	0.356 ± 0.541

* Greater than PDMS-0% ($p < 0.05$) † Greater than PDMS-0% ($p < 0.10$)

CONCLUSION: Porous PDMS RPNIs were viable at 3 months. While porous RPNIs were smaller on the macro and the cellular scale compared to Control, there were no differences in EMG intensity. Conversely, non-porous PDMS RPNIs were severely atrophied with significantly weaker EMG signals. As such, porous PDMS substrate electrodes may be suitable for multi-channel electrode fabrication in RPNI construction.

Abstract #2

Adjacent RPNIs produce Independent Signaling during Voluntary Walking

Andrej Nedic, MSE[1], Daniel Ursu, MS[1,2], Ian Sando, MD[1], Jana D. Moon, BS[1], Cheryl A. Hassett, BS[1], Richard B. Gillespie, PhD[2], Nicholas B. Langhals, PhD[1], Paul S. Cederna, MD[1], and Melanie G. Urbanchek, PhD[1]. [1]Department of Surgery, Section of Plastic and Reconstructive Surgery, University of Michigan, Ann Arbor, MI[2] Department of Mechanical Engineering, University of Michigan, Ann Arbor, MI

OBJECTIVE: Regenerative Peripheral Nerve Interfaces (RPNIs) are neurotized muscle grafts that control prostheses through electromyography (EMG). Two independent RPNIs are required for agonist/antagonist control; however, it is unknown whether signals from adjacent RPNIs are independent. Our purpose was to determine signaling characteristics and independence from two, adjacent RPNIs, with one neurotized by a foot dorsi-flexor (peroneal) nerve and the second neurotized by a foot plantar-flexor (tibial) nerve.
METHODS: Control rats (n=4) had electrodes implanted onto soleus and extensor digitorum longus left leg muscles. RPNI group rats (n=3) had two muscles grafted to the left thigh and implanted with electrodes; one was neurotized with the transected tibial nerve, the other by the transected peroneal nerve. Rats walked on a treadmill, were videographed and raw EMG signals were recorded. Processed EMG was expressed as percent of total stepping cycle activity for each stance and swing gait phase.
RESULTS: EMG activity for Control and RPNI rats displayed alternating patterns of activation coinciding with stance and swing. Independence between peroneal n. and tibial n. activations and quiescence's were defined by comparing Control group differences during stance and swing; these differences were all significant ($p<0.0001$). For RPNI group data, we found the same significant differences between comparisons of peroneal n. and tibial n. activities during stance and swing ($p<0.00001$). These differences equal those found for the Control group and by inference indicate that RPNI signaling is independent during both stance and swing. Out of 96 RPNI stepping cycles, the tibial nerve RPNI was active 95 times and the peroneal nerve RPNI was active 92 times; thus, sensitivities for RPNI signaling were 99.0% and 95.83%, respectively.
CONCLUSION: Adjacent RPNIs neurotized with agonist/antagonist nerves activate independently during voluntary stepping. The sensitivity for activation indicated the RPNI activates when expected. RPNIs provide independent signaling suitable for prosthesis control.

Abstract #3

Comparison of Peripheral Nerve Axonal Area Differences in Central and Peripheral Zones of Injured and Repaired Nerves

Jacob A. Thayer, BS, Ji-Gheng Yan, MD, PhD[1], Lin-Ling Zhang, MD, Robert Havlik, MD, and Michael Agresti. Medical College of Wisconsin

OBJECTIVE: Histological analysis remains a cornerstone approach for the investigation of peripheral nerve regeneration. This study investigates a newly recognized histological difference between peripheral zones and central zones within regenerating nerve trunks.
PURPOSE: The purpose was to determine if nerve axonal area (NXA) in regenerating peripheral nerves differs within central and peripheral areas, when viewed in cross section.
METHODS: Fourteen rats were divided into two groups, and subjected to different injuries to the right sciatic nerve. Group 1: Transection injury with immediate repair. Group 2: Crush injury without any treatment. The left sciatic nerve was left uninjured and served as a control in each rat. Following 4 weeks of recovery, nerve trunk cross-sections were prepared. Computerized techniques were then employed to divide nerve sections into central and peripheral zones and calculate corresponding NXA values for subsequent statistical analysis.
RESULTS: NXA of injured nerves was greater within peripheral compared to central zones, independent of injury type ($P<0.05$). No statistically significant difference existed within control groups or between injury methods with regards to NXA regeneration extent.
CONCLUSION: Nerve axonal area (NXA) in regenerating peripheral nerves was greater in peripheral zones than within central zones.

Abstract #4

Helical Tomotherapy and Cellular Based Immunodepletion for Induction of Immunosuppression in a Rhesus Macaque Allotransplant Model

Kempton Steve, MD, Haynes Lynn, MS, Jankowska-Gan Ewa, MS, Forrest Lisa, VMD, Hematti Peiman, MD, Fernandez Luis, MD, Burlingham William, PhD, and Kaufman Dixon, MD, PhD. University of Wisconsin Hospital and Clinics

PURPOSE: Despite known benefits of total lymphoid irradiation (TLI) in non-myeloablative immune conditioning, composite tissue allotransplant protocols have avoided its use due to concern for injury to healthy "bystander" tissues. The purpose of this study is to determine the safety and efficacy of immunodepletion using a combination of Helical TomoTherapy for TLI and anti-thymocyte globulin (ATG) in a nonhuman primate allotransplant model.
METHODS: Eighteen rhesus macaques were used for this study. One animal received ATG for non-myeloablative conditioning (5 days at 4 mg/kg), where the rest (n=17) received both ATG and Helical TomoTherapy based TLI (10 fractions of 1.2 Gy). All animals were given maintenance tacrolimus and mycophenolate mofetil. Planned and delivered radiation doses to target and bystander tissues were recorded. Animal monitoring included complete blood counts, serum chemistries, and weekly flow cytometric analysis.
RESULTS: All animals did well with no major illness related to induction therapy. ATG immunodepletive therapy alone resulted in lymphocyte depletion; however, lymphocyte recovery was noted after day 7. The combined use of ATG and TLI demonstrated adequate lymphocyte depletion, lasting beyond 14 days; however, severe neutropenia (ANC<500) was noted in 7 animals between days 9 and 21. All lymphocyte subsets recovered to pre-transplant levels by 7–9 weeks post initiation of treatment. Helical TomoTherapy delivered TLI accurately with avoidance of critical normal structures in all animals.
CONCLUSION: A combination of ATG and Helical TomoTherapy for TLI can safely be administered to the rhesus macaque, providing effective immunosuppression beyond 2 weeks without toxicity. This is ideal to allow for engraftment of donor HSC and T cell infusion on treatment day 11. The unique capabilities of TomoTherapy provided sub-millimeter accuracy of delivery by matching the planning and daily megavolt CT imaging and allowed for re-planning during therapy to adjust for weight loss and movement of organs at risk.

Abstract #5

Transient Receptor Potential Vanilloid-1 Channel Blockade as Possible Mechanism of Botulinum Toxin Type-A in the Treatment of Chronic Pain

Chelsea C. Snider, MD, Louis Premkumar, PhD, Baskaran Thyagarajan, PhD, and Michael Neumeister, MD, FRCSC, FACS. Institute of Plastic Surgery, Southern Illinois University School of Medicine

PURPOSE: Recent emergence of the use of botulinum toxin type-A (Btx-A) to treat acute and chronic pain is novel as this neurotoxin has been shown to decrease pain by inhibiting pain modulators and neuropeptides, and by its anti-glutamatergic effects. Human clinical trials provide evidence for the analgesic effects of Btx-A and its benefit against a variety of painful conditions. However, current knowledge of the mechanism by which Btx-A exerts its analgesic action is not fully understood. We hypothesize that Btx-A directly modulates the sensitization of nociceptive transient receptor potential vanilloid 1 (TRPV1) to decrease pain signaling.
METHODS: To investigate the mechanisms involved in the analgesic effects of Btx-A on TRPV1, whole-cell patch clamp measurements and intracellular Ca2+ imaging experiments were used to determine the effects of capsaicin and formalin activity on TRPV1-expressing HEK293 cells in the presence or absence of Btx-A (1nM). Dorsal root ganglions (DRGs) were recovered from cervical, thoracic and lumbar segments of wild type and TRPV1−/− adult mice. The cultured DRG neurons were mixed with pure Btx-A (1nM), heavy or light chain (1nM). Bilateral subcutaneous injections of Btx-A, non-toxic Btx-A (DRBoNT/A), heavy chain (Hc) and light chain (Lc) were used to test toe-spread reflex in mice to determine effectiveness of the variants. Patch clamp and intracellular Ca2+ imaging experiments were repeated to determine the effects of formalin and capcaisin on TRPV1 activity in the presence or absence of Btx-A (1nM) in cultured DRG neurons.
RESULTS: Btx-A inhibited both capsaicin and formalin-stimulated currents and Ca2+ influx into TRPV1-expressing HEK293 cells. Capsaicin and formalin induced a robust current in the control, while Btx-A pretreatment significantly decreased this current. Neither deactivated recombinant botulinum toxin (DRBoNT/A), nor the heavy chain or light chain, caused neuroparalysis by inhibition of the toe-spread reflex. Only the complete form of Btx-A inhibited the toe-spread reflex.
CONCLUSION: This research investigates the effects of Btx-A on nociceptive targets that mediate and sensitize pain signaling. Our preliminary data support the idea that Btx-A inhibits pain by down-regulating cellular mechanisms that sensitize pain signaling via nociceptive TRP channels. Inhibiting the sensitization and excitation of primary afferent neurons to noxious stimuli as a novel mechanism for the inhibitory actions of Btx-A on pain provides new therapeutic perspectives for the use of Btx-A to treat chronic pain pathologies without adverse systemic effects.

Abstract #6

Progressive Stretch of Tissue Expansion Results in Corresponding Changes in Tissue Histology and Cell Proliferation in Skin in an *In Vivo* Porcine Mode

Michael S. Gart, Chad A. Purnell, Adrián B. Tepole, Jolanta M. Topczewska, Ellen Kuhl, and Arun K. Gosain. Northwestern University Feinberg School of Medicine

PURPOSE: While tissue expansion is commonly used clinically, the mechanisms that underlie this process on a cellular level are incompletely understood. We present a model of tissue expansion which allows calculation of stretch on any portion of an expanded skin patch. Biologic changes as skin stretch progressively increases have not been previously characterized.
METHODS: Three tissue expanders were placed subcutaneously in a Yucatan miniature swine underneath 10x10 cm tattooed grids. A control patch was also tattooed. Multi-view stereo photography was utilized to create a 3D model of expanded skin patches and isogeometric analysis allowed precise calculation of the coefficient of stretch and skin growth on any given point on the grid. Skin was analyzed histologically and immunostained for Proliferating Cell Nuclear Antigen (PCNA) and Ki-67 to assess for cell division.
RESULTS: One tissue expander migrated and was excluded from analysis. Skin growth was greatest in areas of greatest skin deformation by isogeometric analysis. As skin stretch increased, epidermal thickness increased ($p<0.001$) and dermis thickness decreased ($p<0.001$). With increasing stretch, the number of dividing cells in the epidermis significantly increased on both analyses of dividing cells ($p<0.001$). Dividing cells in the dermis statistically increased as stretch increased ($p=0.018$ and 0.028, respectively). However, on linear regression analysis, skin stretch was not very predictive of number of dividing cells for PCNA ($R^2=0.051$) or Ki-67 ($R^2=0.098$).
CONCLUSION: Our model of tissue expansion allows measurement of skin stretch and growth at any point utilizing isogeometric analysis. This study agrees with and adds to previous studies of tissue expansion, showing increases in epidermal thickness and cell division in a linear fashion with skin stretch. The dermis thins, but has increasing levels of cell division as stretch increases. This model provides extensive avenues to increase our understanding of the mechanisms of tissue expansion and stretch on skin.

Abstract #7

Hair Follicle Specific ALK2/ACVR1 Critically Regulates Stem Cell Maintenance and Skin Development

Michael Sorkin, Shailesh Agarwal, Shawn Loder, Cameron Brownley, Kavitha Ranganathan, Jon Li, Shuli Li, Paul Cederna, Benjamin Levi. Section of Plastic Surgery, Department of Surgery, University of Michigan Health System, 1500 E Medical Center Drive, Ann Arbor, MI 48109

PURPOSE: Hair follicle stem cells play a critical role in cutaneous wound healing by promoting re-epithelialization. Recent studies have indicated that bone morphogenic protein signaling (BMP) is intricately involved in the quiescence and regulation of these stem cells through activation of BMP receptors. Alterations in this process are known to result in impaired wound healing. Here, we utilize a novel mouse model with targeted overexpression of the BMP receptor ALK2/ACVR1 in hair follicle stem cells, to characterize its role in skin development and postnatal wound healing.
METHODS: Skin samples were harvested from 3-week old NFATc1 promoter driven ALK2/ACVR1 overexpressing mice (NF) and respective littermate controls and subjected to histologic processing. Morphologic differences

including hair follicle number and size were evaluated with H&E staining. ALK3 expression was localized with immunohistochemistry. Furthermore, hair follicle specific stem cell markers Itga6 and CD34 were quantified using flow cytometry.
RESULTS: Histologic examination revealed significantly increased hair follicle number in the NF skin with altered morphology as evidenced by increased follicle size when compared to the control skin. While these were mainly localized in the dermis of control mice, NF skin demonstrated accumulation of follicles in the subcutaneous layer. Furthermore, prevalence of CD34 and ITGA6 positive follicle stem cells was significantly increased in the NF group. Interestingly, no difference was observed in the expression of ALK3.
CONCLUSION: In this study, we demonstrate that hair follicle specific ALK2 is intricately involved in maintenance of the stem cell niche and skin development. Further studies utilizing a wound healing model are currently underway to characterize the effect of ALK2 in this process.

Abstract #8

Intravital Imaging Using a Peripheral Nerve Window

S. Kapur, S. Brodnick, A. Moldyz, M. Hayat, J. Novello, and J.C. Williams, S.O. Poore. Division of Plastic & Reconstructive Surgery, University of Wisconsin, Madison

PURPOSE: The extensive amount of information that can be collected from imaging a minimally disturbed system is an invaluable asset to researchers. To date there are no chronic imaging preparations in the peripheral nervous system (PNS) to observe the morphological and biochemical changes occurring during normal or pathological processes. Intravital-imaging window devices have been used previously to image the brain, spinal cord, and mammary tissue of rodents, but currently have not been used in the PNS because of lack of bone anchoring and access to deep nerve tissue. Despite these constraints, we have developed a novel chronic Peripheral Nerve Window (PNW) that allows for imaging the sciatic nerve for up to two weeks.
METHOD: *PNW Design* – The PNW is a multi-component device, made from polydimethylsiloxane (PDMS), and acrylonitrile butadiene styrene (ABS) using a 3D printer. The device along with a quartz glass attachment is directly sutured into tissue overlying the sciatic nerve. *Surgical Procedure* – In rats under anesthesia, the sciatic nerve is carefully mobilized and elevated into the subcutaneous plane using a strip of biceps femoris muscle. The PNW is then placed directly over the elevated nerve with 10 mm of the sciatic nerve in direct view through the window. *Imaging Procedure* – An upright fluorescent stereoscope is used to obtain bright field and fluorescent images of the sciatic nerve.
RESULT: The sciatic nerve was imaged through the PNW on a daily basis for two weeks. Preliminary data demonstrates device and imaging stability.
CONCLUSION: The PNW provides a chronic stable platform for imaging the sciatic nerve in rats and has implications for real-time daily imaging of pathological processes as well as the potential for the simultaneous coupling of micro-electrode arrays, nerve cuffs, or microfluidic channels while concurrently imaging the sciatic nerve on a chronic basis.

Abstract #9

WITHDRAWN

TRACK 1: SESSION 2 COSMETIC
Abstract #10

Patient Satisfaction Following Combined Endoscopic Brow-Lift and Upper Blepharoplasty for Visual Field Impairment

Ziyad S. Hammoudeh, MD, and Alex Senchenkov, MD. Plastic Surgery Resident, Mayo Clinic

INTRODUCTION: In the aging face, brow ptosis and upper-lid dermatochalasis can lead to visual field impairment. Operative correction is supported as medically-indicated by most third-party payers if a superior visual field difference of ≥12 degrees or 30% is demonstrated before and after manual elevation of the upper lids or brow. The purpose of this study was to evaluate patient satisfaction following combined endoscopic brow-lift and upper blepharoplasty for visual field impairment.
METHODS: All patients undergoing medically-indicated endoscopic brow-lift and upper blepharoplasty by a single surgeon from November 2011 to April 2014 were retrospectively reviewed. A three-incision endoscopic brow-lift technique with Endotine suspension was used in all cases. Patients undergoing a simultaneous lower blepharoplasty or blepharoptosis repair were excluded. Patients were surveyed postoperatively. Satisfaction was assessed using a 5-point Likert scale (1=very dissatisfied, 2=somewhat dissatisfied, 3=neutral, 4=somewhat satisfied, 5=very satisfied).
RESULTS: Twenty consecutive patients (12 females, 8 males) were identified. Median age was 64 years (range 43-80). Preoperative visual field testing in 40 eyes revealed a median superior visual field impairment of 25 degrees (range 5-45). Median follow-up was 20.5 months (range 7-33). All 20 patients (100%) completed the survey. The mean satisfaction score was 4.85 (range 3-5) for improvement of visual field impairment, 4.55 (range 1-5) for upper eyelid appearance, and 4.35 (range 1-5) for brow appearance. Sixteen patients (80%) reported an improvement in activities of daily living. Sixteen patients (80%) reported that they would recommend this operation to a friend. Zero patients required adjustment of glasses or contact prescription within three months of operation. Postoperatively, one patient developed herpes conjunctivitis, and one patient had hoarseness and dysphagia with incomplete resolution following unrevealing neurologic evaluation. Bilateral upper eyelid scar revision was performed in one patient.
CONCLUSION: High patient satisfaction and minimal complications were observed following combined endoscopic brow-lift and upper blepharoplasty for visual field impairment.

Abstract #11

Financial Implications of Migraine Surgery for Surgeons and Hospitals

Rezvaneh Ghasemzadeh, BS, Steve J. Kempton, MD, Venkat K. Rao, MD, MBA, and Ahmed M. Afifi, MD. University of Wisconsin School of Medicine and Public Health

PURPOSE: Migraine surgery is rapidly gaining popularity as a valid, effective treatment option for select migraine patients. The purpose of this study was to analyze the relative financial value of migraine surgery from a surgeon and hospital perspective using breast reconstruction (BR) as a control.
METHODS: Medical records of all new migraine surgery consults of a single surgeon at the University of Wisconsin Clinics and Hospitals were reviewed within a 12-month period (January 2013-14). Hospital and physician accounting records of those who proceeded with surgery were further reviewed. BR was chosen as a control as it is a similarly non-emergent and functional surgery (from a reimbursement perspective) and has similar patient demographics.
RESULTS: Higher rates of outside and self-referrals were found among 58 migraine consults compared to 70 BR consults ($p<0.05$). Insurance type and residence did not differ between both groups. Migraine consult displayed a significantly lower conversion rate (27.4% vs. 65.5%, $p<0.05$). The collection rate for the surgeon was 27.9% for MS and 30.1% for BR ($p=0.71$). Hospital collection rates were 37.1% for MS and 51.0% for BR ($p=0.063$). Mean actual payment to the surgeon and hospital was 1.27 and 2.88 times higher for BR, respectively. Hospital margin for BR was also 2.82 times higher than for MS ($p<0.05$). The average hospital margin for migraine surgery was $6,324.65.
CONCLUSION: In spite of a less favorable margin and actual payment for the hospital and physician (compared to BR), migraine surgery still generates positive revenue for both, also attracting more outside referrals and patients from a wider catchment area. Hospitals and surgeons should continue to embrace this surgery that has been shown (from previous studies) to be medically beneficial to the patients and socioeconomically advantageous to the society.

Abstract #13

Abdominoplasty on Persistently Obese Patients Post Bariatric Surgery, a Paradigm Shift in Patient Selection

A.J. Nadelson, MD, and T. I.L., Benacquista, MD. Rush University Medical Center, Chicago, Montefiore Medical Center, Albert Einstein College of Medicine, Bronx, NY.

BACKGROUND: With the epidemic of obesity in the U.S., there has been a rapid rise in bariatric surgery. After considerable weight loss, a large portion of these patients continue to have body mass indices (BMI) that are above the obesity cut-off level of 30kg/m^2 at the time of consultation for abdominoplasty. These post-bariatric patients are predisposed to complications

with their new malabsorptive anatomy causing redundant stretched skin, poor mobility, and higher likelihood of pre-existing infections underneath these skin folds. Many of these patients benefit from post-bariatric body contouring surgery to improve their activities of daily living. Selection of patients for post-bariatric surgery is thought to be critical to its success and to reduce rates of complications. Historically patients are selected based on several factors including weight-stability for 3 months, a BMI<30kg/m^2, adequate nutritional status, stable medical and psychosocial issues, and reasonable goals and expectations. Based on the current literature, there is a consensus that a higher complication rate occurs with patients who have BMI>30kg/m^2 who undergo abdominoplasty.

PURPOSE: To assess complication rates in post bariatric surgery patients undergoing abdominoplasty, stratifying by BMI, and to compare complication rates of patients below and above the obesity and morbidly obese cutoffs at the time of surgery.

METHODS: A retrospective chart review was conducted. This is a single surgeon's experience of 119 consecutive patients who underwent abdominoplasty after bariatric surgery at MMC between 2004 and 2011. There was no preopertative bias towards patients who have not achieved ideal weight or BMI<30kg/m^2.

RESULTS: Preliminary findings indicate that the overall complication rate was 27%. When the data was stratified by BMI class at the time of abdominoplasty, complication rates were 32% for patients with BMI<30 kg/m^2, 28% for patients with BMI 30kg/m^2 to 34kg/m^2, and 21% for patients with BMI ≥35kg/m^2. P-value for trend was p=0.302. We analyzed the association between presence of complications and: lifetime smoking history (40% complications among smokers compared to 24% among non-smokers, p=0.15); Diabetes (44% complications among DMII compared to 24% in patients without DMII, p=0.09); comorbidities including HIV, hypothyroid, hypertension, asthma, anemia (37% complications in patients with comorbidities compared to 19% with no comorbidities, p=0.03). This study is considered exploratory and p-values should be interpreted with caution. Some of the differences observed would have clinical importance if corroborated in a larger prospectively conducted study.

CONCLUSION: Our data does not provide evidence of an increase in complications among patients who had abdominoplasty post-bariatric surgery before reaching BMI<30kg/m^2. Proper perioperative optimization and modified Lockwood abdominoplasty technique may change the previous assumptions of strict patient selection, as patients with BMI>30kg/m^2 have complication rates equal to or less than those of historical controls.

Abstract #14

Evaluation of Migraine Surgery Outcomes through Social Networking Sites

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PURPOSE: Social Networking Sites (SNS) have been used to study many aspects of health and human behavior. Although SNS present a unique opportunity to obtain unsolicited patient opinions of surgery, their use for evaluation of outcomes has been limited in plastic surgery. Surgical treatment of migraine headaches is a novel treatment; this work aims to use Facebook, the most popular SNS, to evaluate outcomes of migraine surgery.

METHODS: This study evaluated three months of posts and comments regarding headache nerve surgery, nerve stimulator surgery, and radiofrequency/cryoablation from two closed Facebook groups. Outcomes were classified by degree of resolution of symptoms.

RESULTS: A total of 323 posts contained references to surgical management. Of 172 posts commenting on post-op success of nerve surgery, 18.6% reported cure, 59.9% significant improvement, 6.4% partial improvement, 10.5% no change, and 4.7% worse. Thirteen posts referenced nerve stimulator, with 39.8% improvement, 15.4% partial improvement, 7.7% no change, and 46.2% worse. Twenty-five referenced ablation with 52% improvement, 28% no change, and 20% worse. 86.2% of users recommended nerve surgery.

CONCLUSION: The 78.5 % rate of complete or significant resolution of symptoms in this study is very close to the 79.2% rate in Janis et al's series, the 80.5% rate in Ducic et al's series, and the 83.7% rate in Guyuron et al's randomized controlled trial. The fact that unsolicited patient input obtained in this study is similar to the previously published literature adds validity to the data reported in those articles. Similar to Ducic's 2014 systematic review, surgery has higher evidence and efficacy compared to nerve stimulators and ablation. This study adds to evidence favoring headache surgery by removing evaluator bias, and shows that surgical outcomes and satisfaction data may be obtained from SNS.

Abstract #15

WITHDRAWN

Abstract #16

Outpatient Circumferential Abdominoplasty in the Non Post-bariatric Surgery Patient

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PURPOSE: Circumferential abdominoplasty is a body contouring procedure that provides 360° improvement in body shape and contour. However, it has traditionally been used for post-bariatric patients, in the inpatient setting, and associated with a number of drawbacks. Our aim is to investigate these issues when performed in the outpatient setting, while also examining non post-bariatric patient satisfaction with the procedure.

METHODS: A retrospective review of 59 consecutive patients who underwent a circumferential abdominoplasty, performed by a single surgeon in an outpatient setting from 2006 to 2013, was investigated. Patient demographics, comorbidities and operative details were recorded. Major and minor complications, corresponding interventions and postoperative details were followed. Patients were invited to participate in a satisfaction survey at a follow up appointment.

RESULTS: Of the 59 patients undergoing circumferential abdominoplasty, 50.8%, experienced a complication; the majority were minor. A small percentage, 13.6%, required a revision. Increased amounts of tissue and lipoaspirate removed correlated with increased complications, p<0.05. Patients experiencing a complication were more likely to undergo a revision, as were patients with increased BMI, and those having additional procedures performed, p<0.05. The patient survey had a 33.9% response rate. 100% of patients stated that their expectations were met, with an average overall satisfaction rating of 9.4 on a 1 – 10 scale. 45% of patients stated that they experienced problems, but 90% of patients stated that they would undergo the procedure again.

CONCLUSION: Circumferential abdominoplasty can be safely performed in the outpatient setting in the non post-bariatric patient. There is a high associated complication rate, however the majority of complications are minor, and all are non-life threatening. Still, the patients report high rates of satisfaction despite those complications. Patient satisfaction is arguably the most important determination of a successful cosmetic operation. Therefore, integration of outpatient circumferential abdominoplasty is a reasonable option for non post-bariatric patients seeking cosmetic body contouring.

Abstract #17

Tricks, Tips and Pearls for Labiaplasty.

Turkia Abbed, MD, and Florence Mussat, MD. University of Illinois at Chicago

PURPOSE: Request for correction of labia minora hypertrophy is on the rise secondary to increased diffusion of female genital photos through social medias and websites. Women may report a dislike in the appearance of their external genitalia, as well as discomfort in tight clothing, practicing some sports, and sexual intercourse. The wedge labiaplasty, first described by Dr G. Alter in 1995, with subsequent modifications, provide an alternative to the traditional "trim" method, practiced by most gynecologists and urologists.

METHODS: We reviewed 40 patients who underwent wedge labiaplasty for various degrees of labia minora hypertrophy, with or without clitoral hood reduction over a period of 2 years. All surgeries were performed as outpatient under general anesthesia. The average operating time was 1 hour. We followed a protocol developed to reduce potential complications: no surgery

during menstrual cycle, local infiltration in labia majora only, under-dissection of the wedge, icing and bed rest for 48 hours, no sexual activities for 6 weeks post-operatively. Photos were taken preoperatively and postoperatively at 6 months.
RESULTS: The most common complication was flap tip dehiscence which required revision in the office or under anesthesia combined with another cosmetic procedure. All patients reported increased confidence with their appearance and during sexual activities.
CONCLUSION: The wedge labiaplasty is a simple method for correction of labia minora hypertrophy, which is easily combined with clitoral hood reduction if necessary. The operating time is brief. Complications can be minimized by following a simple protocol. The cosmetic results are superior to the trim technique. All patients reported increased confidence in their appearance and during sexual intercourse. The wedge labiaplasty can also be used for revision of previous unsatisfactory trim labiaplasty or other "botched" labiaplasty.

Abstract #18

Risk Factors for Complications After Abdominal Contouring Procedures in the Massive Weight Loss Population - Does Bariatric Method Affect Outcomes?

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PURPOSE: Bariatric procedures are becoming increasingly common, with subsequent increase in body contouring procedures due to significant excess skin after massive weight loss. According to 2013 ASPS Report, abdominoplasty after massive weight loss comprises nearly 40% of 41,998 body contouring procedures. These patients are at increased risk for complications. Our study identifies risk factors in this population with focus on bariatric method.
METHODS: A retrospective analysis of 167 patients (99 post-bariatric surgery and 68 non-bariatric) who underwent abdominal contouring was conducted to identify differences in demographics, comorbidities, and characteristics by type of bariatric procedure (lap band/gastric sleeve/Roux-en-Y) in addition to comparison to non-bariatric cohorts. Bariatric cohorts were analyzed independently and as restrictive (gastric sleeve/lap band) versus Roux-en-Y. Risk factors were examined in multivariate analysis for one or more complications including infection, seroma, and hematoma, among others.
RESULTS: Bariatric and non-bariatric populations were significantly different in terms of payer mix($p<0.0001$), diabetes($p=0.0002$), hypertension($p=0.004$), BMI at time of procedure(32.6 vs 30.6, $p=0.02$) and additional contouring procedures($p<0.0001$). The Roux-en-Y cohort compared to restrictive cohort (gastric sleeve/lap band) was more likely to be older($p=0.03$), male($p=0.017$), smokers($p=0.04$), achieve greater total weight loss(134 vs 96 lbs, $p=0.006$; 134 vs 106 vs 82 lbs, $p=0.003$ across three cohorts), and achieve massive weight loss(>50 lbs, $p=0.005$). Mean BMI achieved prior to abdominal contouring in each cohort was similar($p=0.111$ across 3 cohorts). On multivariate analysis, smoking and HTN were significant risk factors($p=0.0005$, $p=0.003$) for complications and Roux-en-Y vs Restrictive was a near significant risk factor($p=0.08$).
CONCLUSION: Roux-en-Y gastric bypass patients may represent a cohort of patients that may be at increased risk of complications when undergoing abdominal body contouring procedures despite achieving similar BMIs. Control of lifestyle factors (smoking) and co-morbidities (HTN) prior to abdominal procedures is recommended. Awareness of these potential risk factors will aid plastic surgeons in educating patients.

TRACK I: SESSION 3 BREAST I
Abstract #19

Post-Operative Pain and Length of Stay Lowered by Use of Exparel™ in Immediate, Implant-Based Breast Reconstruction

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PURPOSE: Patients undergoing mastectomy and prosthetic breast reconstruction have significant acute postsurgical pain, routinely mandating inpatient hospitalization. Liposomal bupivacaine (Exparel™) has been shown to be a safe and effective pain reliever in the immediate post-operative period, and may be advantageous for use in mastectomy and breast reconstruction patients.
METHODS: Retrospective review of 90 immediate implant-based breast reconstruction patient charts was completed. Patients were separated into three groups of thirty consecutively-treated patients who received one of three pain treatment modalities: IV/oral narcotic pain control (control), bupivacaine pain pump, or liposomal bupivacaine injection. Length of hospital stay (LOS), patient reported Visual Analog Scale (VAS) pain scores, postoperative patient-controlled analgesia usage and nausea-related medication use were abstracted and subjected to ANOVA and multiple linear-regression analysis, as appropriate.
RESULTS: Subjects were well-matched for age ($p=0.24$) regardless of pain-control modality. Roughly half (53%) of Control and pain-pump treated subjects had bilateral procedures, as opposed to 80 % of liposomal bupivacaine subjects. Mean LOS for liposomal bupivacaine subjects was significantly less than control (1.5 days v. 2.00 $p = 0.016$) Liposomal bupivacaine subjects reported significantly lower VAS pain scores at 4, 8, 12, 16, and 24 hours compared to pain pump and control ($p < 0.01$). There were no adverse events in the liposomal bupivacaine group.
CONCLUSION: Use of liposomal bupivacaine in this group of immediate breast reconstruction patients was associated with decreased patient VAS pain scores in the immediate post-operative period compared to bupivacaine pain pump and IV/oral narcotic pain management and reduced inpatient LOS.

Abstract #20

Remote Single Incision Mammary Augmentation: A Series of 599 Patients

Amanda K. Nelson, and Robert M. Gerson. Institution: University of Wisconsin

PURPOSE: Remote single incision mammary augmentation with inflatable saline implants through transumbilical (TUBA), transaxillary (TABA), and trans-scar (TSBA) approach remains a safe, effective, patient-driven procedure.
METODS AND RESULTS: 599 consecutive patients with an age distribution of 17-62 years old underwent remote mammary augmentation by a single surgeon in private practice as follows: TUBA 562 (93.82%), TABA 23 (3.84%), TSBA 14 (2.34%). A total of 72 patients (12%) required operative revision for symptomatic capsule, pocket irregularity, implant exchange for asymmetry, hematoma, deflation of implant, umbilicoplasty, or operative difficulty requiring counter incision. 63.2% of total revisions were in patients with large implant (>350mL, includes TUBA/TABA/TSBA) placed under pectoralis major muscle.
CONCLUSION: The advantages, disadvantages, overview of the technique, complications in TUBA TABA and TSBA remote single incision breast augmentation are discussed. This single surgeon case series of 599 consecutive patients demonstrates a 12% revision rate, and notable increased incidence with sub-muscular placement of large breast implant.

Abstract #21

Use of Acellular Dermal Matrix (ADM) in Post-Mastectomy Breast Reconstruction: Are all ADMs Created Equal?

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PURPOSE: AlloDerm and FlexHD are two types of acellular dermal matrices (ADM) commonly used in implant-based reconstruction. Although the use of ADM has revolutionized immediate breast reconstruction in the setting of breast cancer, it remains unclear which type of ADM is best. The purpose of this retrospective cohort study was to compare post-operative complication rates between these two types of ADM.
METHODS: We reviewed the records of all patients who underwent implant-based breast reconstruction at our institution between 1998 and 2013. Dependent variables of seroma, hematoma, infection, delayed wound

healing, mastectomy flap necrosis, implant exposure, and return to the operating room for management of complications were recorded.
RESULTS: A total of 309 consecutive patients were identified. Of these, AlloDerm was used in 123 (39.8%) patients while FlexHD was used in 186 (60.2%) patients. Most patients in our cohort underwent immediate reconstruction (n=288, 93.2%) with a mean follow-up of 20.0 months. Patients receiving Alloderm were half as likely to have major infections, compared to patients with FlexHD (OR 0.50, 95% confidence interval 0.16-1.00), p<.05). The rates of other complications were similar between the two groups.
CONCLUSIONS: There are significantly increased odds of a major infection in patients who undergo implant-based breast reconstruction using FlexHD compared to AlloDerm.

Abstract #22

Immediate Implant Exchange during Acute Infection in the Setting of Breast Reconstruction

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PURPOSE: Acute prosthesis infection in the breast reconstruction patient is traditionally managed with explantation followed by delayed replacement. However this results in loss of expansion, placing significant psychological and physical burden on patients. We describe our experience managing breast reconstruction infections with operative washout and immediate implant replacement.
METHODS: An IRB-approved retrospective review was performed at the University of Michigan including all breast reconstruction patients who underwent surgical management for an infected breast implant by the senior surgeon (D.L.B.) from January 1, 2010 to December 31, 2013. Patient charts were reviewed for demographic information, implant type (expander versus permanent implant), whether the implant was immediately replaced, final reconstruction status, and time from washout to final reconstruction (months).
RESULTS: A total of 19 breast reconstruction patients with 20 breast expander/ permanent implant infections requiring operative intervention were identified. All patients underwent removal of the infected implant. Immediate exchange was performed in eight patients (42%). Intraoperative cultures identified organisms in 13 (65%) infections. Intravenous antibiotics were started on seventeen patients and one patient was started on oral linezolid. All eight patients (100%) with immediate replacement went on to have successful reconstruction; 75% (9/12) of infections which were not treated with immediate replacement went on to be fully reconstructed (p = 0.24). Mean time to final reconstruction among patients who had immediate replacement was 203 days, compared with 599 days in patients who did not have immediate replacement (p = 0.03).
CONCLUSIONS: Here we describe our experience with immediate prosthesis exchange in breast reconstruction patients with infection. Our findings suggest that this technique is safe in appropriately selected patients. Furthermore, patients treated with immediate exchange have less time to final reconstruction.

Abstract #23

Effect of Incision Location on Skin Necrosis Following Nipple-Sparing Mastectomy with Immediate Breast Reconstruction- Analysis of a Single Institution's Early Experience

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PURPOSE: Necrosis of the nipple areola complex and/or breast skin after nipple-sparing mastectomy (NSM) with immediate breast reconstruction (IBR) is a common complication that may delay adjuvant therapy and lead to poor outcomes. We hypothesized that periareolar incisions are associated with increased rates of skin necrosis.
METHODS: Consecutive cases of NSM with planned IBR performed between 2009 and 2011 were reviewed. Incision location was classified as: 1) periareolar, or 2) non-periareolar (Figure 1). A photographic and chart review was performed to assess outcomes of ischemic/necrotic skin injury and complete nipple loss. Any degree of ischemic/necrotic injury was included in the analysis. Data analyses were performed on a per breast basis using statistical methods that took the within patient correlation into account.
RESULTS: One-hundred and five women (180 breasts) were identified: 82 breasts (46%) had periareolar incisions and 98 (54%) had non-periareolar incisions. 90 out of 180 (50%) operated breasts in 62 patients experienced necrosis of some degree. 14 out of 180 (7.8%) operated breasts in 12 patients experienced nipple loss. Regarding incision type, the n (%) developing necrosis across the 6 original categories were 28/59 (47%), 11/41 (27%), 5/5 (100%), 6/18 (33%), 38/54 (70%), and 2/3 (67%). 39/82 (48%) of those breasts with a non-periareolar incision developed necrosis compared to 51/98 (52%) in those with a periareolar incision (p-value = 0.0046). Additional variables that were significantly associated with necrosis were BMI, initial fill volume, radiation therapy and absence of acellular dermal matrix. Regarding incision type, the n (%) experiencing nipple loss across the 6 original categories were 5/59 (8.4%), 3/41 (7.3%), 1/5 (20%), 1/18 (5.6%), 3/54 (5.6%), and 1/3 (33%). For nipple loss, 8/100 (8%) of non-periareolar incisions developed necrosis compared to 6/80 (7.5%) in those with periareolar incisions (p-value = 0.83).
CONCLUSION: In this sample of our early experience with NSM and IBR, the choice of periareolar incision for NSM with IBR is associated with higher skin necrosis outcomes.

Abstract #24

An Analysis of Tobacco Use, Diabetes, and Steroid Use on Wound Complications in Reduction Mammoplasty.

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BACKGROUND: Traditional teaching suggests that soft tissue results are suboptimal in certain conditions. As such, we are all taught that smokers, diabetics and patients who are on steroids have more wound healing issues. This has held true in specific and focused datasets in the plastic surgery literature. Yet, the broader implications outside of study conditions have not been established.
PURPOSE: We hypothesized that diabetics, smokers and steroid users would experience increased wound related complications when compared to their peers undergoing reduction mammoplasty.
METHODS: Under the data use agreement of the American College of Surgeons, public use files of the National Surgical Quality Improvement Project were queried for reduction mammoplasty cases. Patients with preoperative comorbidities of active smoking, diabetes, and steroid use were identified. Wound related complications as noted by wound dehiscence was assessed.
RESULTS: There were 10,424 breast reductions in the eight years of NSQIP datasets (2006–2013). Smokers represented 10.6% of the population. When comparing the general population versus tobacco users, the wound dehiscence increased from 0.6% to 1.5%, p<.001. Those who had recently used steroids comprised only 1.2% of the breast reduction population and no significant difference when comparing wound dehiscence (p=.56) was noted. Diabetics represent three categories: no diabetes, diabetes on orals and those on insulin (IRDM). They experienced no significant increase in wound complications.
CONCLUSION: In our analysis, we were not able to confirm some of the commonly held surgical beliefs. While smokers did fare significantly worse, neither the steroid users, nor any form of diabetics were noted to have significant related morbidity. Although this is an observational study that cannot show causation it does lead to an interesting concept that our traditionally held believes may not be as accurate as previously thought.

Abstract #25

A Muscular Etiology for Medial Implant Malposition Following Sub-Pectoral Augmentation

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BACKGROUND: Implant malposition is becoming an increasingly recognized complication following subpectoral breast augmentation. Although several causes of medial malposition have been previously demonstrated, medial implant malposition secondary to unintended pectoralis muscle slips has not been previously described.
PURPOSE: The goal of this study is to describe a form of medial implant malposition caused by pectoralis major and minor musculature vectors on the implant.
METHODS: The primary investigator (CLM) performed a retrospective review of all patients who underwent revisional breast surgery for the diagnosis of symmastia or medial implant malposition following subpectoral augmentation. Those patients with muscular type etiology for medial implant malposition were identified.
RESULTS: Five patients with pectoralis muscle slips causing medial implant malposition were identified. The pectoralis muscle slips were successfully diagnosed on preoperative exam and corrected with specific surgical procedures aimed at balancing surrounding forces and thus correcting malposition.
CONCLUSION: Pectoralis muscle slips contributing to medial malposition can be found in some patients after subpectoral breast augmentation. The etiology of this deformity is unknown, but theorized to be caused by anatomic predisposition with slips inadvertently formed during subpectoral pocket formation arising from the pectoralis minor and or incompletely released or accessory pectoralis major muscles.

Abstract #26

Post-operative Drain Time Analysis, Outcomes and Complication Rates in Patients Receiving "Meshed" Versus "Un-Meshed" Acellular Dermal Matrix (adm) in Partial Sub-Muscular Breast Reconstruction

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PURPOSE: The partial submuscular breast reconstruction technique using acellular dermal matrix (ADM) is commonly used for breast reconstruction with tissue expanders. Several studies have cited increased fluid accumulation/seroma formation deep to the matrix [1,2,3], and increased rates of infection[2] that seems to be handled by an additional drain between the ADM and the skin flap. We attempted a novel approach with manual perforations in the ADM to facilitate more rapid adherence to the skin flap, thus limiting post-operative drainage. Drain times and complication rates were compared between meshed (M-ADM) versus unmeshed ADM (UM-ADM).
METHODS: We analyzed 19 M-ADM and 84 UM-ADM patients, all from a single plastic surgeon. Study variables include age, diagnosis, smoking status, presence of diabetes or hypertension, surgery type, implant size and fill volume, drain-time, BMI and general surgeon. The relationship between drain time and type of ADM, (M or UM), was analyzed, controlling for variables: diabetes, hypertension, smoking status[1], BMI[4], tissue expander/implant size[1], radiation treatment, and general surgeon. Minor and major complication rates were assessed and compared. Range of follow up in the M-ADM group was 2 years, in the UM-ADM group up to 8 years.
RESULTS: There was no significant difference between mean age or BMI of the two groups. In a bivariate analysis, there was a significant statistical difference between drain times in the two groups ($p < 0.05$). We will present the results of the analysis controlling for the variables mentioned above.
CONCLUSION: To our knowledge, this is the first study to examine the relationship between post-operative drain time and complication rates of patients receiving meshed versus unmeshed ADM in breast reconstruction. Our study results provide implications on improving surgical outcomes, potentially lowering post-operative complications, through a varied technical application of the use of ADM in expander/implant based breast reconstructions.

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Abstract #27

A Systematic Review of Comparison of Autologous, Allogeneic and Synthetic Augmentation Grafts in Nipple Reconstruction

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PURPOSE: A variety of materials are available for projection augmentation in nipple reconstruction including autologous, allogeneic and synthetic grafts. To date, there has been no systematic review to study the efficacy and complication rates between these materials.
METHODS: MEDLINE, EMBASE and PUBMED databases were searched from their inception to August 2014 to identify literature reporting on nipple projection outcomes of autologous, allogeneic and synthetic grafts in nipple reconstruction following breast surgery. Retrospective and prospective studies with controlled and uncontrolled conditions were included. Studies reporting exclusively on the use of autologous flap techniques without grafts, manuscripts lacking report of post-operative outcomes and case reports were excluded. Studies were assessed for quality using the Newcastle-Ottawa Quality Assessment Scale (NOQAS).
RESULTS: Thirty-one articles were selected for review that satisfied our search and exclusion criteria (11 prospective, 20 retrospective) including 1334 nipple reconstructions with augmentation material use. The majority of studies used autologous tissue (19), followed by allogeneic grafts (7) and finally, synthetic materials (5). Reported complication rates were highest in studies utilizing synthetic products, followed by studies utilizing autologous tissue and finally allogeneic grafts. Reported complications included material extrusion, partial flap/graft necrosis, dyschromia, hyposensitivity and wound dehiscence. After evidence review, one study represented two out of nine stars on the NOQAS, two studies represented three stars, six studies represented four stars, seven studies represented five stars, eleven studies represented six stars and four studies represented seven stars.
CONCLUSION: Studies are heterogeneous in type of material used within each category and are inconsistent in methodology used in outcomes assessment. Overall the quality of evidence is low. Synthetic materials may have a higher complication rate secondary to exposure while allogeneic grafts may have comparable nipple projection to autologous grafts. Further investigation with high-level evidence is necessary to determine the optimal augmentation material for nipple reconstruction.

TRACK I: SESSION 4 BREAST II/MICROSURGERY

Abstract #28

WITHDRAWN

Abstract #29

Maximizing the Volume of Extended Latissimus Dorsi Flap for Autologous Breast Reconstruction with Immediate Fat Grafting and Thoracoabdominal Advancement Flap

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PURPOSE: Despite variable modifications to the extended Latissimus dorsi flap, its use in autologous breast reconstruction remains limited due to insufficient volume unless at the expense of increased donor-site morbidity. The study reviewed combination techniques to maximize volume in extended Latissimus dorsi flap in total autologous breast reconstruction, which incorporated immediate fat grafting and a thoracoabdominal flap.
METHODS: Between August 2012 and June of 2014, 8 patients (11 breasts) underwent total autologous extended latissimus dorsi flap breast reconstruction with a low transverse skin paddle, combined with simultaneous fat grafting and thoracoabdominal flap. The Latissimus myocutaneous flap was raised and transferred to the chest using standard technique. Fat was harvested and injected into four principles areas around the breast: the pectoralis major muscle, thoracoabdominal flap, mastectomy flap, and latissimus dorsi flap (Figure 1a and 1b). The pectoralis major was injected first, followed by the thoracoabdominal flap and mastectomy skin flap. The thoracoabdominal flap is de-epithelialized and anchored first to the chest wall over pectoralis major (Fig 2a and 2b). The latissimus dorsi flap was partly inset on top of the pectoralis major muscle and the thoracoabdominal flap. Prior to final inset, fat was injected into the distal latissimus.
RESULTS: All 11 flaps survived with no complications such as infection, fat embolism, and seroma or delayed wound healing during the follow-up period. Mean volume of fat injected in each flap was 188 cc. Mean follow up was 12.5 months. No fat necrosis was observed. 3 patients needed repeat fat grafting for volume.
CONCLUSION: The maximized latissimus dorsi flap with immediate fat grafting and thoraco-abdominal advancement flap is a reliable and efficient technique for autologous breast reconstruction.

Abstract #30

WITHDRAWN

Abstract #31

Breast Reconstruction with SIEA Flaps: A Review of Our Experience with 145 Free Flaps

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PURPOSE: Refinements in microsurgical breast reconstruction have led to the advent of the SIEA flap, yet technical difficulty with anastomosis has limited its widespread acceptance. We aim to evaluate our experience with breast reconstruction utilizing SIEA/SCIA flaps.
METHODS: We conducted a retrospective chart review of all SIEA/SCIA free flaps performed by the senior authors between January 2006 and February 2014.
RESULTS: One hundred forty-five flaps were performed in 119 patients including 123 SIEA (85%) and 6 SCIA (4%) flaps. Ten unilateral reconstructions consisted of a SIEA hybrid flap: 7 SIEA/DIEP (5%), 6 SIEA/SIEA (4%), 2 SIEA/SCIA (1.4%), and 1 SIEA/ms-TRAM (0.6%). Arterial donor and recipient mismatch occurred in 55 instances (38%). Forty-eight arteries (87%) were spatulated and 7 (13%) were back-cut to improve size concordance. Thirteen flaps (9%) required operative return for: hematoma (n = 2), arterial (n = 5) or venous thrombosis (n = 3), mastectomy skin necrosis (n = 2), and concomitant arterial and venous thrombosis (n = 1). Total flap loss rate was 4.1% (n = 6) and partial loss rate 1.4% (n = 2). No flaps taken back for arterial thrombosis were salvageable despite attempted correction within 24 hours (n = 5). Furthermore, 80% had arterial revisions at initial operation and none were spatulated. The majority (67%) of flaps with venous thrombosis were recoverable.
CONCLUSION: Our data suggests that although SIEA/SCIA breast reconstruction can be reliably performed, flaps exhibiting post-operative arterial thrombosis with revision at initial surgery were unlikely salvageable upon re-operation. Spatulation did not correlate with increased thrombosis rate; in fact, we advocate for donor artery manipulation via back cuts or spatulation to manage size mismatch. To facilitate inset and maximize pedicle length, harvesting the contralateral abdomen is essential, as is fully opening the cribiform fascia to expose the SIEA at its origin.

Abstract #32

A Systematic Review of Post-operative Outcomes Following Variations of the Myocutaneous Gracilis Flap in Autologous Breast Reconstruction

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PURPOSE: Transverse upper gracilis (TUG) flaps have become reliable donor-site options for reconstructions of small- to medium-sized breasts. Based on injection studies, the dominant angiosome of the gracilis flap is horizontal; however, modifications using a vertical skin component have been introduced for breast reconstruction. This review aims to compare flap characteristics and post-operative outcomes of three design variations of the gracilis myocutaneous flap in breast reconstruction.
METHODS: We used the PUBMED, MEDLINE, EMBASE, and Google Scholar databases from January 1966 through December 2014 to identify potentially relevant studies. Inclusion criteria included studies reporting post-operative outcomes of patients receiving transverse upper gracilis (TUG), vertical-transverse(V-TUG), and longitudinal-only(LGM) flaps in breast reconstruction.
RESULTS: A total of 12 studies encompassing 455 flaps in 317 patients were included; eight studies utilized the TUG flap (370 flaps in 261 patients), three studies utilized the V-TUG flap (70 flaps in 44 patients) and one study utilized the LGM flap (15 flaps in 12 patients). V-TUG and LGM flaps did not report any flap failures, while TUG flaps reported varying rates of total (1.9-25.0%) and partial (1.3-10.6%) flap failures. Wound dehiscence, fat necrosis and flap necrosis were frequent complications in TUG and V-TUG flaps. V-TUG flaps had greater flap weights (492.9 g) than TUG flaps (125.0-385.5g); patients with TUG and LGM flaps had more lipofilling or implant placement procedures to increase breast volume than patients with V-TUG flaps.
CONCLUSION: TUG, V-TUG and LGM variations are acceptable flaps for use in breast reconstruction. V-TUG variations of the gracilis flap can generate larger flap volumes and improve aesthetic breast outcomes without potential need for additional fat grafting or implant procedures, or increased risk of flap failure. The V-TUG flap is an effective alternative for patients who consider the additional scarring as an acceptable drawback for the benefit of increased breast volume.

TRACK II: SESSION 1 CRANIOFACIAL
Abstract #33

Modeling Pfeiffer Syndrome in Zebrafish by CRISPR-targeted Homologous Recombination

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PURPOSE: The Pro252Arg gain-of-function substitution in FGFR1 is associated with Pfeiffer syndrome in humans, and leads to craniosynostosis (CS). Utilizing CRISPR/Cas9 genome editing in combination with homologous recombination, the present study aims to mimic Pro252Arg within the fgfr1a zebrafish locus. In addition to creating a complementary CS model, we aim to establish a novel method that allows for nucleotide substitutions within targeted loci.
METHODS: CRISPR/Cas9 genome editing utilizes guide RNA (gRNA) to target a specific DNA sequence and Cas9 endonuclease to create a double stranded break at the target site. Upon cleavage, a non-homologous end joining mechanism is induced by the cell to repair damaged DNA. We designed an exogenous site-specific oligonucleotide template, which bears the mutated sequence. When provided together with gRNA and cas9 mRNA, the cas9 targeted fgfr1 region is substituted with the desired Pro252Arg mutation. gRNA, cas9 mRNA, and oligonucleotide were coinjected into single-cell stage embryos. To identify genome-editing events, specific primers

were designed to amplify the modified sequence by PCR and diagnostic restriction site polymorphisms were used to assess recombination events.
RESULTS: Injected G0 fish (n=41) were genotyped as described above. Amplified fragments were detected in addition to incomplete digestion of DNA for ~80% of injected fish (n=32), indicating high efficiency of the CRISPR/Cas9-mediated mutagenesis. We observed phenotypic differences of varying degree, including dysmorphic head shape and abnormal scale patterning in these mutant fish. We assessed the effects of genetic manipulation on suture phenotype through histological analysis, which revealed locally fused sutures, and gene expression studies.
CONCLUSION: We demonstrate the effectiveness of CRISPR/Cas9-targeted homologous recombination in editing the zebrafish genome. Preliminary assessment suggests that Fgfr1-mutant fish exhibit a phenotype consistent with fgfr1 misregulation. Once validated, the proposed model of Pfeiffer syndrome may provide a new tool to further assess the role of Fgf signaling in cranial suture pathology.

Abstract #35

Perioperative Anticoagulation is a Positive Predictor of Complications in Patients Undergoing Cranial Reconstruction

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Abstract: Despite advancements in materials and techniques used for cranial reconstruction, complication rates following reconstructive cranioplasty remain significant. In this study, the association of perioperative anticoagulation use and/or a hypercoagulable state with minor (i.e. not requiring surgical intervention, n=11) and major (i.e. surgical intervention required, n=18) complications after reconstructive cranioplasty for large-sized skull defects (>5 cm^2) was assessed. A retrospective cohort review of 108 consecutive cranioplasties (>5cm^2) performed between 2011 and 2014 was conducted. Multivariate logistic regression analysis was performed with forward selection of significant variables on an bivariate analysis. Twenty-three (21.3%) primary and 85 (78.7%) secondary (i.e. delayed) cranioplasties were performed on 94 patients with a median age of 50 (38–63) years. Median full thickness calvarial defect size was 154 (104–230) cm^2. Eleven (10.2%) minor and 18 (16.7%) major postoperative complications occurred in 26 (24.1%) cases. Multivariate logistic regression analysis revealed that coagulation status (i.e. perioperative use of anticoagulation therapy or hypercoaguable state) was statistically significant in predicting minor complications (OR=7.1, 95% CI 2.1-23.9, p=0.002). Of note, the odds of a minor complication were an order of magnitude higher when both perioperative anticoagulation and a hypercoagulable state were present. To our knowledge, this is the first study to document that the use of perioperative anticoagulant therapy for patients with thromboembolic conditions is a positive predictor of complications following cranioplasty.

Abstract #36

Quantitative Analysis of Dual-Purpose, Patient-Specific Craniofacial Implants for Correction of Temporal Deformity

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BACKGROUND: The development of computer-assisted design, virtual modeling, and computed tomography (CT) has allowed precise customization of implants for patients who undergo neurosurgical or craniofacial surgery procedures. However, such techniques and implant designs have not adequately addressed temporal asymmetry due to either post-operative bone resorption, temporalis muscle malposition/foreshortening and/or temporal fat pad atrophy.
PURPOSE: With this in mind, we hypothesized that an alteration in customized craniofacial implant (CCI) design with a strategic extension infero-laterally and excessive material bulking would provide simultaneous reconstruction of co-existing temporal skull defects and therefore reduce the effect of soft tissue deformities.
METHODS: A single surgeon, single institution retrospective cohort study was performed to include ten consecutive subjects who underwent cranioplasty reconstruction with modified implants during a three-year period. Implants were placed using our previously described pericranial-onlay technique. Using a CT-based, computer-assisted design/manufacturing (CAD/CAM) methodology, novel dual-purpose implants were designed to prevent and/or correct persistent temporal hollowing (PTH). Efficacy of the new CCI shape and design for cranial restoration of temporal symmetry was analyzed in both two and three-dimensions.
RESULTS: In two-dimensional analyses, the modified implant provided enhanced lateral projection (21%; 1.06 cm) in areas closest to the temporal arch. Three-dimensional volumetric analyses demonstrated that additional bulking totaled 24 ± 11 cm^3 (range 9–43 cm^3), which essentially replaced 40 ± 13.7% (range 26-60%) of the absent temporal volume contributing to PTH.
CONCLUSION: Computer-designed, dual-purpose CCIs can be safely created with unprecedented shape to prevent and/or eradicate post-operative temporal deformity.

Abstract #37

An Analysis of Independent Variables Affecting Surgical Outcomes in Patients Undergoing Repair of Facial Fractures: An ACS-NSQIP Study

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BACKGROUND: Facial fractures, from straightforward closed nasal reductions to complex pan facial fractures, are commonly encountered in the Plastic Surgical community. However, very little has been discussed in the literature regarding the outcomes of facial fractures relating to contributing factors.
PURPOSE: Our aim was to evaluate a battery of independent variables in order to identify, which, if any, factors correlate with poor outcomes in patients who have undergone facial fracture surgery.
METHODS: Under the data use agreement of the American College of Surgeons public use files of the National Surgical Quality Improvement Project, cases involving repair of facial fractures, CPT codes 21315 to 21470 inclusive, were queried. The outcomes we chose to examine included: wound dehiscence, superficial surgical site infection, deep surgical site infection, readmission, open wound/wound infection and return to the operating room.
RESULTS: There were 2,069 facial fracture cases in the eight years of NSQIP datasets (2006-2013). Open wound/wound infection was the most prevalent outcome at 6% of cases. Variables that were evaluated included age, race, gender, weight, ASA classification, level of resident involved in the case, level of residency supervision, emergency case, diabetes mellitus, dialysis, active tobacco use, heavy alcohol use, chronic steroid use, presence of bleeding disorder, and length of operating time. Factors statistically significant for presence of open wound/wound infection were ASA classification (p=0.002), presence of bleeding disorder (p=0.008), emergency case (p=0.001), chronic alcohol use (p=0.002), and chronic steroid use (p=0.034).
CONCLUSION: Several factors were found to correlate with presence of an open wound/wound infection; however, variables such as presence of diabetes and active tobacco use, which were often thought to contribute to wound infections, were shown to be statistically non-significant. Although this study was limited by its observational nature, these data may indicate a change in perception of the factors correlated with wound infections.

Abstract #38

A Novel Classification of Frontal Bone Fractures with Skull Base Extension

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PURPOSE: Although frontal sinus fractures and their associated complications have been described extensively, fracture patterns of the frontal bone as a broad unit of the craniofacial skeleton have not been rigorously characterized.
METHODS: Maxillofacial CT scans of trauma patients were reviewed over a five year period, and frontal bone fractures were classified: Type 1: Frontal sinus fracture without vertical extension. Type 2: Vertical fracture through the orbit without frontal sinus involvement. Type 3: Vertical fracture through the frontal sinus without orbit involvement. Type 4: Vertical fracture through the frontal sinus and ipsilateral orbit. Type 5: Vertical fracture through the frontal sinus and contralateral or bilateral orbits. We also identified the depth of skull base extension, including whether the fracture involved the anterior, middle, or posterior cranial fossa. A chart review was performed for all patients to identify associated complications.
RESULTS: Among 1,980 craniofacial trauma patients, 149 patients (7.5%) had frontal bone fractures. There were 51 non-vertical frontal sinus (Type 1, 34.2%) and 98 vertical (Types 2–5, 65.8%) frontal bone fractures. Vertical fractures extended deep into the skull base, penetrating the middle or posterior cranial fossa significantly more often than non-vertical fractures (62.2 v. 15.7%, p=0.0001). Vertical fractures also had a significantly higher mortality rate than non-vertical fractures (18.4 v. 0%, $p<0.05$). Vertical fractures with frontal sinus and orbital extension (Types 4 and 5), and fractures that penetrated the middle or posterior cranial fossa had the strongest association with intracranial injuries ranging from epidural hematoma to transtentorial herniation, optic neuropathy, disability, and death ($p<0.05$).
CONCLUSION: Vertical frontal bone fractures have a significantly higher mortality rate than frontal bone fractures limited to the frontal sinus. Vertical fractures with extension into the frontal sinus and orbit, or with extension into the middle or posterior cranial fossa have the highest rates of optic neuropathy, disability, and mortality.

Abstract #39

Immediate Single Stage Cranioplasty Following Calvarial Resection for Benign and Malignant Skull Neoplasms Using Customized Craniofacial Implants

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PURPOSE: Craniectomy defects following resection of calvarial neoplasms are most often reconstructed with on-table manufacturing. With the advent of computer-aided design/manufacturing (CAD/CAM) and customized craniofacial implants (CCIs), there seems to be more suited alternatives. In this study we report our experience and outcomes using single-stage, CCI-based reconstruction for benign and malignant skull neoplasm defects.
METHODS: A retrospective review of all implant cranioplasties performed between 2011 and 2014 by a single craniofacial surgeon was performed. Pre- and post-operative CT scans with 3D reconstruction were performed to assess adequate resection and final outcomes. Primary endpoints included length of surgery, predicted defect-versus-postoperative implant surface area, contour irregularities and complications.
RESULTS: Of the 108 cranioplasty patients identified, 7 patients underwent immediate CCI-based reconstruction for calvarial neoplasms. Four patients (4/7, 57%) presented with malignant pathology. All defects were >5 centimeters squared. As compared to their original delivery size, all implants were modified intra-operatively (between 0.2 - 40.8%) with a mean of 13.8%. Follow-up ranged between 1 to 16 months. There were no implant-related complications identified. Aesthetic results and patient satisfaction were both ideal.
CONCLUSION: With this preliminary experience, we have successfully demonstrated that immediate customized implant reconstructive techniques, by way of intraoperative modification, are both safe and feasible for benign and malignant skull neoplasms. We believe that with wider acceptance of this multidisciplinary approach and increased surgeon familiarity, this technique will soon become the reconstructive standard of care.

Abstract #41

Use of 3D Airway Imaging in Evaluation of Patients with Respiratory Distress and Micrognathia

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PURPOSE: Mandibular distraction osteogenesis (MDO) is an effective treatment for patients with micrognathia and severe recurrent airway obstruction[1–5]. However the efficacy of the procedure is based on selecting the appropriate patient. Presence of central apnea or airway obstruction anywhere other than the tongue base will make MDO futile. The availability of three dimensional reformatting of the airway has greatly improved the accuracy of correct patient selection, providing a powerful tool to further characterize the pathology in these patients.
METODS: We conducted a retrospective review of the last thirty patients with micrognathia and severe recurrent airway obstruction seen in consult by the senior author for potential role of surgery in their management.
RESULTS: Twenty-one patients met our inclusion criteria, with fourteen treated appropriately with MDO. The remaining patients had findings on the 3D airway CT scans with other anatomic causes of obstruction making them inappropriate candidates for mandibular distraction osteogenesis.
CONCLUSION: The use of three dimensional formatting of the airway from CT scans obtained using low dose protocols has improved the accuracy of evaluation and treatment of Pierre Robin patients. Most valuable is the non-invasive identification of airway abnormalities that would make mandibular distraction osteogenesis ineffective in correcting the airway obstruction.

TRACK II: SESSION 2 GENERAL RECONSTRUCTION

Abstract #42

Intrathoracic Muscle Flaps: A 20-year Experience of 437 Consecutive Patients

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PURPOSE: Muscle flaps can be used to aid in healing of intrathoracic infections and can be used prophylactically for bronchial stump coverage following lung resection when there is a high-risk of stump breakdown due to airway tension or previous radiation. Large series examining intrathoracic muscle flaps (ITMFs) are lacking in the literature. The purpose of this study was to analyze the morbidity/mortality of ITMFs and create an algorithm for their use.
METHODS: All patients undergoing ITMF from January 1991 to December 2010 were retrospectively-reviewed. Patients were stratified into two groups based on infectious or prophylactic indication, and outcomes were compared between groups. Demographic information pertinent to surgical outcome was collected in both groups, including age, BMI, diabetes, end-stage renal disease, smoking status, chemotherapy/radiation, and ASA classification.
RESUTLS: There were 437 consecutive patients (292 males, 145 females) who underwent 490 IMFs (353 serratus anterior, 52 latissimus, 37 intercostal, 30 pectoralis major, 7 omentum, 3 rectus abdominis, 8 other). Multiple ITMFs were used in 44 patients (range 1–5 total flaps). Median age was 60 years (range 16–91). ITMFs were used for infection in 264 patients (24.1% previously-irradiated) and prophylactically in 173 patients (64.9% previously-irradiated). The rate of complications was significantly higher in the infected group (56.3%, n=147) vs. prophylactic group (23.3%, n=40) ($p<0.0001$). In-hospital mortality was significantly higher in the infected group (14%, n=37) vs. prophylactic group (5.2%, n=9) (p=0.005; odds-ratio 3.0). In-hospital mortality was significantly higher in patients having multiple flaps vs. a single flap (20.5% vs. 9.4%) (p=0.028; odds-ratio 2.5). Median length-of-stay following ITMF was 14 days (range 1–258) with median ICU length-of-stay of 4 days (range 0–258). Median follow-up for patients discharged was 12 months (range 0–274).
CONCLUSION: Use of ITMFs in complex intrathoracic conditions can be lifesaving. However, patients still experience substantial morbidity and mortality. An algorithm is presented to help guide flap selection.

Abstract #43

WITHDRAWN

Abstract #44

Treatment of Keloid Scars with Excision and Adjuvant Radiation: A Single Center: Experience and Review of the Literature

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PURPOSE: Management of keloid scars has remained a conundrum, as an optimum treatment regimen has yet to be elucidated. Currently, treatment varies widely between more conservative measures, such as steroid injections, topical medications, and silicone sheeting, to more aggressive options, such as surgery and post-operative radiation. The latter combination has been touted to have superior results, with the lowest rates of pathologic scar recurrence.
METHODS: We performed a retrospective review to critically evaluate the effectiveness of surgical excision and radiation treatment in patients with keloid scars. Surgical resection of surgeon-selected scars, combined with state-of-the-art postoperative cutaneous radiation therapy, was employed at a major tertiary referral center. For patients with poor follow up, phone calls were made to administer a questionnaire. In addition, we presented a review of the current literature to provide a comprehensive synopsis of current keloid treatment.
RESULTS: A total of 71 patients' records were reviewed. We found that the overall recurrence rate of pathologic scars was 28%, but in patients followed for more than one year, the recurrence rate was 69%.
CONCLUSION: At this time, the evidence supporting surgery and radiation for the treatment of keloids remains equivocal and randomized controlled studies are needed to determine the efficacy of this treatment protocol. However, both the literature and our high recurrence rates do support using a higher radiation dose than the one currently used at our institution.

Abstract #45
Incidence of Wound Complications Following Kidney Transplantation: Implications for the Plastic Surgeon

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PURPOSE: We sought to determine the incidence and predictors of wound complications within the first year following kidney transplantation.
METHODS: We performed a retrospective review of 2,748 kidney transplants performed at our center between 1 Jan 2002 and 1 April 2013. Wound complication was defined as any wound infection, drainage, dehiscence, or hematoma/seroma involving the incision site. Multivariable regression models were used to analyze associations between several factors and wound complications. These factors included recipient age, gender, pre-transplant diabetes (DM), pre-transplant dialysis, primary transplant, BMI, donor type, delayed graft function (DGF), acute rejection, cold ischemic time (CIT), previous abdominal surgery, and deceased donor type.
RESULTS: Of the 2,748 kidney transplants reviewed, 1,678 (61%) were deceased donor and 1,070 (39%) were living donor transplants. Type 2 diabetes mellitus (DM) was the most common primary kidney disease (n= 434, 15.8%) and 2,050 patients (74.6%) were dialysis-dependent at the time of transplant. Mean follow-up was 6.4 ± 3.6 years. Overall 1, 3, and 5-year graft survival rates were 92.2%, 82.8%, and 74.0%, respectively. Overall 90-day, 1-yr., 3-yr., and 5-yr. wound complication rates were 16.1%, 21.3 %, 28.8%, and 32.3% respectively. The most common wound complications were surgical site infections, wound seromas and drainage. Multivariable analyses revealed that CIT (HR 1.02, p= 0.01) BMI (HR 1.05, $p < 0.0001$), DGF (HR 1.32, $p<0.01$), and acute rejection (HR 1.61, $p<0.0001$), correlated with the development of wound complications. The absence of DM was associated with a 21% reduction in wound complication rate (HR 0.79, p=0.01).
CONCLUSION: Wound complications remain a significant source of morbidity for kidney transplant recipients. Patients with high BMI and DM are at significantly increased risk. Strategies aimed at decreasing rates of acute rejection and DGF, and shortening CIT may mitigate the incidence of wound complications. Prompt intervention may lead to a decrease need for subsequent reconstructive surgery.

Abstract #46

Modification of Pectoralis Myocutaneous Advancement: Flap for Sternal Wound Reconstruction

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PURPOSE: The median sternotomy is a common approach for many cardiothoracic surgeries. Despite recent advancements in surgical technique, post operative complications, including a 7% rate of deep sternal wound infections after sternotomy and are associated with significant morbidity and mortality.[1] Macromastia has been shown to increase infections in deep sternal wound reconstruction due to the inferolateral forces placed on the wound by the that ptotic breast .[2]

The purpose of this study was to assess the results and applicability of a modified chest closure technique employing bilateral pectoral myocutaneous advancement flaps after sternal re-approximation without internal fixation for postoperative sternal wound infection and to evaluate use of dermoglandular sling reinforcement in patients with macromastia.
METHODS: The study population is a single surgeon's experience from 2010 to 2015. Nineteen patients with deep sternal wound complications underwent anatomic sternal wound reconstruction supported by the modified corset technique of pectoralis myocutaneous advancement flaps. Two patients with macromastia underwent additional dermoglandular sling reinforcement to the contralateral chest wall. Medical records were retrospectively reviewed for patient demographics, comorbidities, postoperative complications and additional operative interventions.
RESULTS: Nineteen patients presented with type II sternal wounds following cardiothroacic surgery. Following anatomic chest wall reconstruction at up to one year follow up with the modified corset technique, nine patients (50%) had complete resolution of wound. Two patients (11%) required additional debridement for persistent wound infection. One (5%) mortality was due to overwhelming sepsis. Two patients who underwent dermoglandular sling reinforcement of sternal wound for macromastia, had resolution of wound infection.
CONCLUSION: Anatomic sternal reconstruction supported by bilateral pectoral myocutaneous advancement flaps (corset modification) is a good technique for recalcitrant sternal wounds to stabilize bony framework. Additionally, medial breast dermoglandular slings to contralateral chest wall can be utilized to further stabilize and reduce sternal retraction forces in patients with macromastia.

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Abstract #47

Hospital Acquired Pressure Ulceration at FMLH in 2013

Goyal Samita, MD, and Havlik Robert, MD. Medical College of Wisconsin

PURPOSE: To investigate characteristics of patients who developed decubitus ulcers during their hospitalization at Froedtert Hospital in 2013, with specific emphasis on whether patients with poor nutrition are underweight.
METHODS: A retrospective chart review of all patients flagged for hospital acquired pressure ulceration in the year of 2013. 69 events were identified as developing stage II pressure ulceration or above during their inpatient hospital stay. Inclusion criteria for this study included stage II ulceration, ulcer not present on admission, and inpatient hospital stay. After chart review, 12 events were excluded, yielding a total number of 57 events in 55 patients.
RESULTS: Of 55 patients, 38 were male and 17 female, with an average age of 57.67 ± 15.27 years. Average time until ulceration identified by nursing was 12.15 ± 8.10 days with an average hospital stay of 33.78 ± 22.11 days. Admission Braden score was 16.96 ± 3.25 with a lowest Braden score prior to ulceration13.38 ± 3.31. The average body mass index (BMI) was 29.64 ± 9.93. Of the 55 patients, 3 were identified as underweight, 17 normal, 14 overweight, 10 obese, 4 severely obese, 4 morbidly obese, and 3 super obese. Of the 55 patients, only 30 had pre-albumins; the average BMI of these patients was 30.76 ± 11.53 with an average lowest documented prealbumin 9.68 ± 6.66.
CONCLUSION: Although patients who develop pressure ulcers are in catabolic states, the majority of patients at FMLH who developed pressure ulcers

were found to be overweight and obese (35/55 patients). Traditionally, emphasis during nursing care is focused on reducing pressure at identifiable pressure points in thinner patients; this data may lead into the development of new strategies to prevent ulceration in the overweight patient.

Abstract #48

Wide Excision and Healing by Secondary Intent for the Surgical Treatment of: Hidradenitis Suppurativa: A Single Center Experience

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PURPOSE: This study reviewed a single center's 14-year experience with surgical treatment of chronic, severe hidradenitis suppurativa (HS) through wide excision technique and healing by secondary intention.
METHODS: All patients who underwent wide excision of HS between 2000–2014 and allowed to heal by secondary intention were included. Wound care consisted of topical antimicrobials and hydrotherapy. Physical therapy was initiated for joint contracture prevention. Patients were followed until complete wound closure.
RESULTS: Seventeen patients underwent 23 separate surgical encounters, 5 with excision of multiple areas. Seventeen excisional procedures were conducted on the upper half of the body (axillary, breast) and 11 on the lower half (inguinal, perineum, perianus, abdomen). Two patients developed HS recurrence adjacent to the surgical site (1 requiring re-excision, 1 treated with topical therapy), whereas 3 developed flare at non-surgical sites managed medically. Follow up was mean 1.02 years, median 6 months, range 1.2 months to 5.25 years. Complete wound healing ranged from 8 weeks to 1.35 years, with limited range of motion in 2 patients.
CONCLUSION: Complete and wide excision of all tissue affected by HS is the standard of care for complete local cure. Our experience with wide excision of disease and healing by secondary intent demonstrated excellent functional and aesthetic results in multiple anatomic areas, and even for large defects. This healing modality requires strict adherence to the wound healing protocol, which is often tolerated only by patients who have endured symptoms of severe HS for an extended length of time.

Abstract #49

Outcomes of Open Flank Hernia Repair Using Midweight: Soft Polypropylene Mesh

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PURPOSE: A certain nihilism exists regarding bulges and hernias of the lateral abdominal wall. Often attributed to "denervation injuries," described reconstructions include wide external meshes and large dissections to create additional scar and support. Our experience is that contour changes in the lateral abdominal wall after flank incisions represent true hernias that can be repaired with acceptable complication rates and a low chance for recurrence. Here we analyze our experience treating these patients with flank bulges and hernias using a prosthetic mesh over the past ten years.
METHODS: A retrospective review of patient records was performed for all patients who underwent flank hernia repair with the senior author (G.A.D) at Northwestern Memorial Hospital between 2003 and 2014. Patients were treated with use of a 7.5 cm wide macroporous mesh and reapproximation of the abdominal wall to achieve a direct supported repair.
RESULTS: 30 patients met inclusion criteria. Mean BMI was 31.9 ± 7.3 kg/m^2 and mean transverse hernia size was 17.8 ± 26 cm. All repairs were performed with polypropylene mesh, with 19 intraperitoneal placements. The remainder was placed between the external and internal oblique or preperitoneal space. Mean operative time was 127 ± 36 minutes. There were no surgical site infections or 30-day surgical site occurrences, as defined by the American College of Surgeons National Quality Improvement Program. Mean hospital length of stay was 4.3 ± 1.8 days. After a mean follow-up of 656 days, two patients developed minor eventration at the prior hernia site, one of which was repaired operatively with additional mesh, and the other managed conservatively. One small recurrent hernia was noted incidentally on a follow up CT scan. There were no bowel obstructions related to the mesh.
CONCLUSION: Direct supported repair of flank hernias using macroporous polypropylene mesh is a safe and effective technique associated with a short hospital stay and low complication rates. Surgical nihilism for this condition is unwarranted.

Abstract #50

Surgical Reduction of Scrotal Massive Localized Lymphedema (MLL) in Obesity

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PURPOSE: Lymphedema of the penis and scrotum is physically and psychologically disabling. Obesity is a source of secondary lymphedema. When restricted to specific anatomical regions in obesity, this is termed massive localized lymphedema (MLL). Few surgical cases of specific scrotal MLL in obesity are reported in the literature. We present our case series to improve the management of this complicated pathology.
METHODS: This is a retrospective review of obese adult patients with clinically diagnosed scrotal MLL undergoing reduction scrotoplasty by the senior author (J.R.S.) from 1992 to 2012. Medical, social, familial, surgical, and follow-up data were extracted. Prior infection of the scrotal lymphedema, surgical details, pathologic evaluation, and postoperative complications were noted. A series of the cases is presented.
RESULTS: Four cases met the criteria for study. The average age was 35 years with an average body mass index of 53.9. Average resection at the first procedure was 3492 g. All patients were reconstructed with laterally based scrotal flaps. The pathology for each case was consistent with chronic lymphedema; no sarcomatous changes were noted. Fifty percent of the patients had recurrence of the scrotal MLL. The average total number of operations during the follow-up period for either complication or recurrence was two.
CONCLUSIONS: This is the largest case series specifically investigating surgical treatment for scrotal MLL in obesity. Lateral-based scrotal flaps (with or without mid-raphe Z-plasty) permit anatomic reconstruction. Complications are common and recurrence is frequent after surgical management. Excision with reconstruction improves urinary function and overall symptoms.

TRACK II: SESSION 3 MICROSURGERY / HAND & EXTERMITY

Abstract #51
WITHDRAWN

Abstract #52

Range of Motion Outcomes After Reconstruction of Post-Burn Wrist and Hand Deformities

James McCarthy, MD

PURPOSE: The aim of this work is to evaluate the efficacy of skin grafts and flaps in reconstruction of postburn hand and wrist deformities, and examine factors associated with improved outcomes.
METHODS: A prospective study of 57 postburn contractures of the wrist and dorsum of the hand (19 flexion and 38 extension contractures) was performed. Flaps were used only if there was an exposed structure after release of the contracture, otherwise a skin graft was used. Range of motion (ROM) was used to assess hand function. The percentage of functional wrist ROM was compared pre and post-operatively.
RESULTS: The extension deformity cohort uniformly required split-thickness skin graft following contracture release. The mean ROM increased from 56.1 (SD +/− 40.8) preoperatively to 123.9 degrees (SD +/− 55.2) post-operatively ($p < 0.0001$); the mean percentage of functional wrist ROM increased from 42.5% to 93.2% ($p < 0.001$). Complications included loss of a significant part of the graft in 1 patient and need for second surgery for further release in 8 patients. Need for secondary surgery was the lowest in contractures immobilized with a K wire. The flexion deformity cohort was treated with either skin grafts (8 patients) or flaps (9 patients).The mean preoperative ROM increased from 45.5 (SD +/− 11.2) to 88.9 degrees (SD +/− 16.2) post-operatively ($p < 0.0001$) and the percentage of functional wrist ROM for activities of daily living increased from 18.7% to 85.5% ($p < 0.0001$).
CONCLUSION: Skin grafts suffice for most dorsal hand contractures to restore normal wrist ROM. MP fixation by K wire is associated with decreased recontracture compared to fingernail sutures or splints. For flexion contractures,

skin grafts were associated with a greater improvement in ROM, likely reflecting the severity of the contracture. Early release of postburn contracture is advisable before deeper structures are irreversibly contracted.

Abstract #53

A Novel Method of Osteosynthesis in Upper Extremity Transplantation Using an Ulnar-Shortening Ostetomy System for Simultaneous Both Bone Fixation

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PURPOSE: Osteosynthesis in upper extremity allotransplantation continues to be a challenge. Achieving adequate cortical contact and compression between donor and recipient proves difficult. The large area of dissection around the osteotomy sites and the use of immunosuppressants further deters healing, making nonunion a significant risk.
METHODS: Five distal forearm transplants were completed using cadaver models. Osteotomies and fixation were carried out using the Newclip ulnar shortening osteotomy system. 2.5mm plates were applied to the donor radius and ulna. The osteotomy cut guides with slots at 0,2,4, and 6mm were affixed to the plates and donor osteotomies were performed at the 0mm slot. The donor and recipient were brought together and recipient osteotomies were completed at the 6mm cut guide slot. Osteotomy site compression was obtained using a hand crank rack-and-pinion system located on the osteotomy guide. If compression was achieved in one bone but not the other, the remaining gap was measured and the corresponding numbered cut-slot was used to shorten the opposite bone to achieve an exact length match.
RESULTS: This technique enabled reproducible and precise osteotomies and osteosyntheses in a cadaver distal forearm transplant model. We reliably matched radial and ulnar length and accurately controlled ulnar variance to avoid undue stress on the DRUJ. The multiple osteotomy slot options on the construct allowed titration of bone length to achieve exact coaptation.
CONCLUSION: The capability to perform osteotomies, compression, and fixation of both bones simultaneously allowed for more exact osteosyntheses and a decrease in operative time. This technique modification could have major implications for obtaining rapid and precise fixation in upper extremity allotransplantation while minimizing ischemia time.

Abstract #54

Anesthesia in Hand Surgery: What is the Evidence?

Stephanie Suprenant, MD. Institution: University of Wisconsin

PURPOSE: Anesthesia in hand surgery is determined by available resources, published data, training, and experience of the surgeon and anesthesiologist. Due to practice variability, a meta-analysis was conducted to establish level I evidence.
METHODS: A systematic review of randomized clinical trials (RCTs) in anesthesia and hand surgery was conducted using PubMed. Restrictions included human species, English language, no publication date restriction, and core journals.
RESULTS: 58 citations were identified for which 34 RCTs were applicable. Purpose of RCTs related to tourniquet placement 3% (1/34), premedication 9% (3/34), anesthetic additives 32% (11/34), anesthetic selection 12% (4/34), digital blocks 15% (5/34), brachial plexus blocks 21% (7/34), and general versus regional anesthesia 9% (3/34).
CONCLUSION: There are evidence-based conclusions regarding anesthesia in the following hand surgery topics: *Tourniquet placement* – Forearm tourniquets require 50% less anesthetic than upper arm tourniquets. *Premedication*- Gabapentin and melatonin significantly improve postoperative pain. Toradol improves pain whether in block injection or pre-/post-operatively. *Anesthetic additives* – Anesthetic alkalization improves pain of injection but does not affect action duration. Dexmedetomidine, paracetamol, magnesium, and clonidine prolong anesthetic duration. Tramadol, in anesthetic injection, does not improve pain relief. *Selection of anesthetic* - Bupivacaine and ropivacaine have similar pain relief ratings but are superior to 1% lidocaine, 2% lidocaine, and lidocaine with epinephrine. *Digital blocks*- Epinephrine is safe in digital blocks. Single volar versus two dorsal injections result in similar anesthesia. Patients prefer single volar injections. Superior anesthesia was achieved with digital versus metacarpal blocks for finger repairs. *Brachial plexus blocks* – Supraclavicular and infraclavicular approaches had similar outcomes. Double injection axillary blocks are superior to mid-humeral. Highest patient reported pain relief was achieved with brachial plexus block and targeted nerve anesthesia. *General versus regional anesthesia*- Regional and general anesthesia have similar rates of postoperative neuropathy. Regional is superior to general anesthesia for outpatient hand surgeries.

Abstract #55

Urban Frostbite 2014: One University's Burn Center Experience

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PURPOSE: Under ideal circumstances, severely frostbitten extremities are rapidly warmed and treated with thrombolytic therapy within 6–24 hours. In an "inner city," urban environment, most patients who suffer frostbite injuries present in a delayed fashion, sustain repeated cold injuries further complicated by psychological issues or intoxication, and are rarely ideal candidates for thrombolytic therapy within the prescribed timeframe. We describe our experience with the treatment of urban frostbite injuries during the extreme Winter of 2014.
METHODS: This study is a retrospective review of cold injuries sustained between November 2013 - March 2014 that were treated at an 8-bed burn unit in an urban setting.
RESULTS: Fifty-three patients were treated for frostbite during the Winter of 2014 (42 males, 11 females). Average age was 43 years (range 2–84 years). Ten patients were classified with deep frostbite. No patients met criteria for thrombolytic therapy due to multiple freeze-thaw cycles or presentation greater than 24 hours after rewarming. Of these ten patients, 9 underwent debridement, which resulted in partial limb amputations at levels guided by Tc-99m bone scans. Wound closure was then achieved by: free flap coverage (n=2), a combination of V-Y and reverse sural artery flaps (n=3), split thickness skin grafting (n=1) and secondary intention healing (n=3). Of the 337 digits/limbs affected, 51 digital amputations were performed in addition to 4 proximal amputations including: TMA (n=2), Lisfranc, and a partial hand. Overall amputation rate was 21%.
CONCLUSION: While tPA has been successful in reducing the need for digital amputation following frostbite injuries, in our experience, this treatment modality is not applicable to the urban patient population who often present late and after cycles of re-injury. Therefore, our approach focused on salvaging limb length with flap coverage as the injuries were unable to be reversed.

Abstract #56

Mechanical and Neurological Methods of Hind Limb Immobilization Differentially Alter Heterotopic Ossification in a Mouse Model of Burn with Achilles' Tendon Injury

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PURPOSE: Patients with burns are at risk for the development of heterotopic ossification (HO), as are patients with spinal cord injuries resulting in limb paralysis. Mobilization is an important management strategy in preventing contractures, but the impact of mobilization on HO formation is controversial, as reflected in conflicting retrospective studies. To elucidate underlying mechanisms, we tested the effect of hind limb immobilization on HO formation via splinting versus peripheral nerve injury in our validated burn-tenotomy mouse HO model.
METHODS: Male C57BL/6 mice (age 8 weeks) underwent Achilles' tenotomy and 30% total body-surface area partial-thickness dorsal trunk burn, followed by no immobilization (*control*, n=3) or immediate hind limb immobilization. Immobilization was performed via two techniques: 1) continuous plastic splinting of the ankle and knee (*mechanical*, n=3), or 2) sciatic nerve transection resulting in limb paralysis (*neurologic*, n=3). Mice were analyzed by μCT and histology for HO formation at 5 weeks. Separately, adipose-derived mesenchymal cells (MSCs) from control mice were cultured in osteogenic differentiation medium on plates with axial mechanical strain, with subsequent osteogenic differentiation assessed by alkaline phosphatase.
RESULTS: Splinted mice developed less HO than control mice (0.75 v. 1.61 mm^3; $p<0.05$). While HO forms particularly at the calcaneus in controls, splinted mice failed to develop any HO at the calcaneus (0 v. 0.97 mm^3,

p<0.01). In contrast, nerve-injured mice developed more HO at the calcaneus compared to controls (3.17 v. 2.24 mm^3; p<0.05). In vitro, we noted significantly more alkaline phosphatase deposition when mechanical load was applied to MSCs.
CONCLUSION: This study demonstrates that immobilization plays a role in HO formation in our burn-tenotomy mouse model. Interestingly, HO formation differs if immobilization is rendered mechanically by splinting or by peripheral nerve injury. Future studies will assess mechanisms behind these differences as well as key immobilization time-points to mitigate HO formation.

Abstract #57

Bony Chimeric Anterolateral Thigh Free Flap for Oral Cancer Reconstruction - Anatomic Study with Report of 2 Cases

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PURPOSE: The anterolateral thigh (ALT) flap and the variations based off of the lateral circumflex femoral artery (LCFA) has allowed for great flexibility in addressing reconstructive problems throughout the body including the head and neck. The types of tissues available including skin, fascia, muscle, and nerve allows for versatility in flap design while simplifying the reconstruction with a singular lengthy vascular pedicle. However, previous descriptions of ALT variants have never included bone.
METHODS: An anatomic study of 16 fresh cadaver limbs was undertaken to elucidate the typical branching patterns to the femur bone of the descending branch of the LCFA. Two oral cancer patients are presented who were reconstructed using ALT flaps with a bony segment of femur. Both patients had recurrent disease with extensive floor of mouth and tongue defects, small mandible defects (2 cm), and limited donor site options.
RESULTS: From the cadaveric studies, 4 branching patterns to the anterolateral middle to distal third of the femoral shaft were observed. Both patients went on to heal the oral cavity, achieved mandibular union, and experienced no serious donor site morbidity with a minimum of 18 months follow-up.
CONCLUSION: Composite defects of the head & neck, as well as the extremities, frequently require bone in order to achieve the goals of reconstruction. However, previous surgeries, trauma, and/or vascular disease may preclude the use of the traditional donor sites for vascularized bone. An anatomic study of the branching pattern of the LCFA to femoral bone is presented in addition the report of 2 cases of oral cancer patients who benefited from this reconstruction to demonstrate the feasibility of the bony chimeric ALT flap.

Abstract #58

Indocyanine Lymphography - Have We Found a Reliable Postoperative Monitoring Modality for Lymphaticovenular Anastomosis and Lymph Node Transfer?

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INTRODUCTION: Autologous lymph node transplant (ALNT) and lymphaticovenular anastomosis (LVA) are two promising surgical treatment for lymphedema. The investigations on treatment outcomes are, however, limited by the absence of an accurate measuring system to track postoperative improvement. Currently available measuring methods include circumference measurement, water displacement, and three-dimension scanning. These may be inaccurate, inconvenient and/or requiring specialized equipment. We evaluated the utility of indocyanine (ICG) lymphography as a postoperative monitoring modality after lymphedema surgery.
METHODS: 14 patients underwent treatment of limb lymphedema with either ALNT or LVA at University of Iowa Hospitals and Clinics between August 2013 and March 2014. All were females. Four had lower extremity lymphedema and seven had upper extremity disease. Except for two patients having primary lymphedema, all had disease secondary to cancer treatment. Three patients underwent ALND and the rest received LVA. ICG lymphographic staging was performed by conducting the ICG lymphography preoperatively and at three and six postoperative months. Patients were also assessed qualitatively and quantitatively with several metrics including the circumference measurements and upper/lower extremity lymphedema indices.
RESULTS: A total of 112 LVAs were constructed. Two supraclavicular and one groin lymph node transplants were performed. All patients experienced prompt relief of lymphedema symptoms during the first postoperative week and further improvement in the following months. All demonstrated clinical disease regression based on Campisi classification. All also demonstrated lymphographic evidences of disease regression. Interestingly, despite all having demonstrable clinical improvements, five patients demonstrated paradoxical increase or insignificant decrease in the circumference-based lymphedema indices.
CONCLUSION: The circumference-based measurements were found to be prone to inter- and intra-rater errors and did not correlate well with clinical findings. In contrast, the ICG lymphography correlated well to clinical findings and showed promise to replace the circumference-based methods as the method of choice to track postoperative changes following lymphedema surgery.

Abstract #59

Prevalence and Distribution of Potential Vascularized Composite Allotransplant Donors, Implications for Optimizing the Donor-Recipient Match in a UNOS-Based Allocation System

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PURPOSE: Vascularized composite allotransplantation (VCA) is the transplantation of multiple tissue types as a functional unit such as a hand, face, or abdominal wall. There have been over 100 hand and 31 face transplants to date. The 5-year allograft survival rate for hand transplants is > 90% compared to 75% for kidney transplants. UNOS recently elected to classify VCAs as "organs" and began oversight of VCA allocation on July 3rd, 2014. Little is known about the prevalence and distribution of organ donors who could also be candidates for VCA donation in this new allocation system.
METHODS: A custom dataset of donor characteristics was obtained from UNOS of all brain-dead donors from 2008–2013. To identify the prevalence of potential VCA donors, inclusion and exclusion criteria used for VCA were applied to the dataset. Frequency analyses were then performed of characteristics important for VCA matching.
RESULTS: The dataset began with 42,414 brain-dead donors and after applying the inclusion and exclusion criteria, decreased to 17,460 (41.2%). The number of potential VCA donors per UNOS region ranged from 85-527/yr (Fig. 1). The majority of potential VCA donors were blood type O, CMV+, Whites, with the least common profile being blood type AB, CMV-, Asians (Fig. 2).
CONCLUSION: VCA is in the early stages of standard of care as evidenced by UNOS oversight and increasing acceptance by the medical community. Analysis of the UNOS donor database reveals a large potential donor pool. Understanding the characteristics of previous organ donors can guide VCA teams in optimizing the donor-recipient match in this new field of transplantation and thus maximize patient outcomes following transplantation.

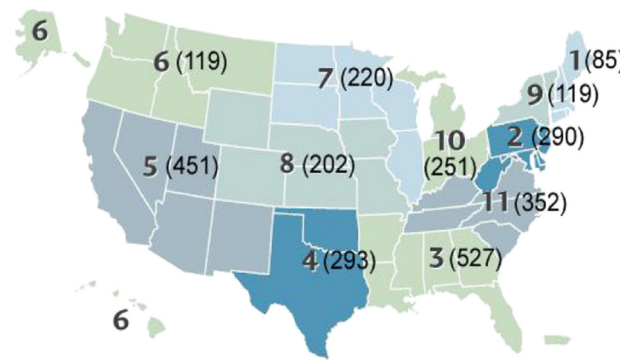

FIGURE 1. UNOS Regions (# of Potential VCA Donors/year).

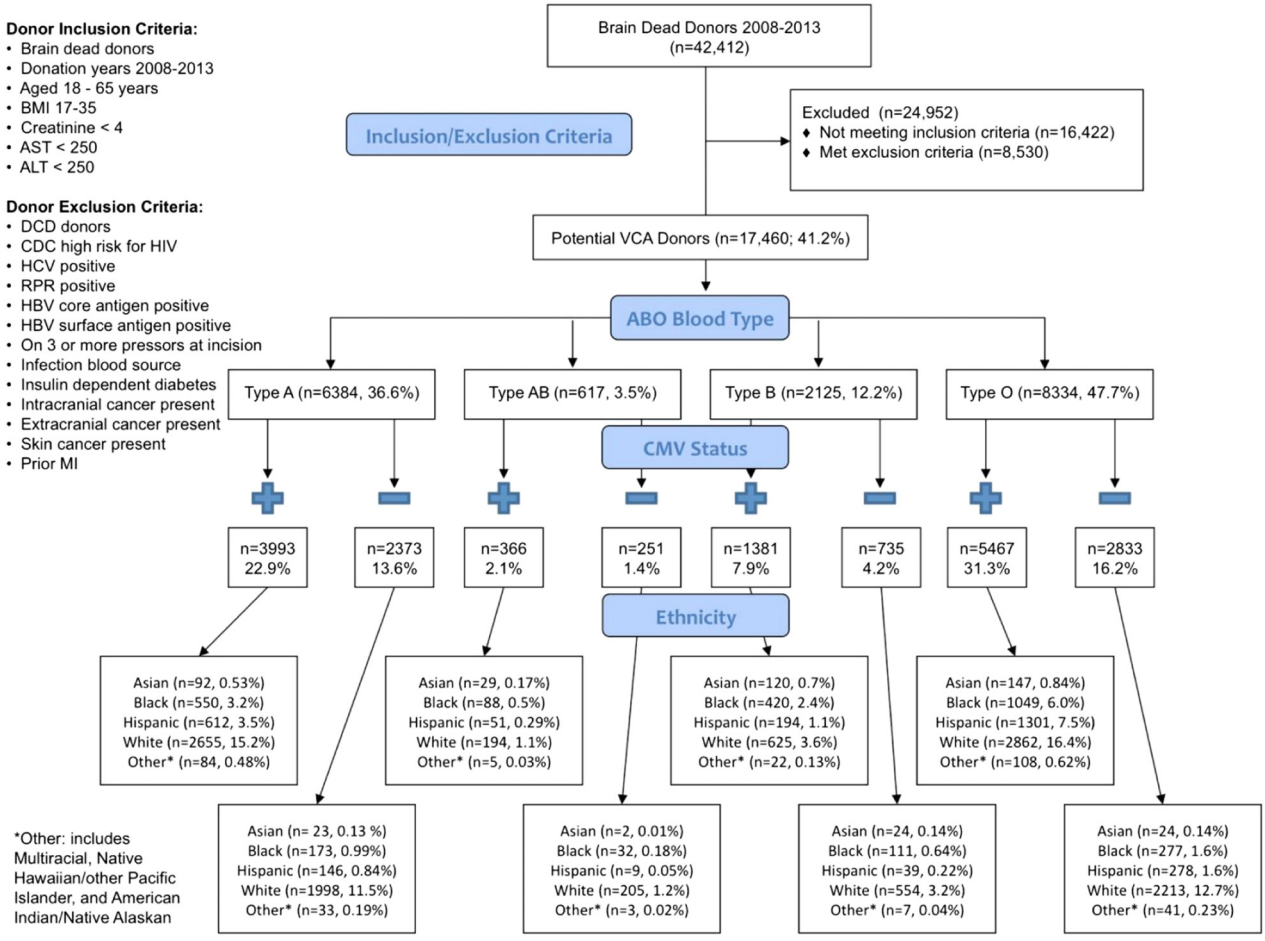

FIGURE 2. Prevalence of Potencial VCA Donors from UNOS Database 2008-2013.

TRACK II: SESSION 4 PHYSICIAN EXPERTISE

Abstract #60

Mobile Surgical Evaluation Tool-An Efficient Tool Providing Documentation and Immediate Feedback

Richard Korentager, MD, FACS, Julie Holding, MD, and Patrick McBride. University of Kansas Department of Plastic Surgery Physician

The evaluation of plastic surgery residents is a challenging process. To become a skilled plastic surgeon requires not only ability to diagnose and develop treatment plans but also the ability to execute those plans in a safe, efficient and effective manner. Current evaluation systems that are designed to assess trainees technical competence generally require faculty to either fill out forms or sit down at a computer to complete the evaluation. Human nature is such that during the course of a busy day in the operating room these are frequently done well after the fact or not done at all. This leaves the evaluators to try to remember how the resident performed when this is not fresh in their mind and does not facilitate the immediate feedback that has been demonstrated to be most helpful for residents.

We have developed a smartphone based application that builds on the surgical skills assessment tool that was developed by the Plastic Surgery Milestone Group. We felt that the evaluation tool needed to be immediately accessible to both the faculty as well as the residents, to be able to be filled out rapidly and give a template for immediate feedback. The collected data is then saved in a database for future additional evaluation. We will present the initial data which demonstrates a high level compliance and satisfaction among the faculty and residents.

We feel that utilization of this type of smart phone app will increase our ability to give meaningful feedback and evaluations to our trainees on their plastic surgery as well as on plastic surgery rotations.

Abstract #61
WITHDRAWN

Abstract #62

Gender Confirmation Surgery in the Male-to-Female Individual: A Single Surgeon's Fourteen Year Experience

Loren S. Schechter, MD, FACS. University Plastic Surgery

PURPOSE: The goals of gender confirmation surgery in the male-to-female transgender population include a successful cosmetic and functional result, such that an individual experiences harmony between one's body and one's self identity. However, surgery is but one component in the overall therapeutic process. Furthermore, an evidence-based approach guiding surgical management is lacking.
METHODS: The author reviews his fourteen year experience with an individualized, multi-disciplinary approach to gender confirmation surgery in the male-to-female transgender population. This includes a review of the embryology of the male and female external genitalia as well as the author's anatomic approach to the creation of homologous female genitalia from the male counterpart.
RESULTS: The author's pre-operative evaluation and individualized, multidisciplinary approach, surgical decision-making and operative technique regarding orchiectomy, single-stage vaginoplasty, clitoroplasty, urethraplasty, labiaplasty, and aesthetics of the mons pubis are described.

Included in the description is the author's technique of single-stage component separation of the male external genitalia utilizing the penile inversion procedure with a scrotal-perineal flap (and/or full-thickness skin grafts) and intestinal transposition with right and/or left colon. Additionally, requirements for a sensate,

functional neo-vagina and neo-clitoris are reviewed. Finally, complications, postoperative management, and long-term follow-up care are described.

Description of technique: Single stage vaginoplasty

1. Single-stage component separation with the penile inversion procedure and scroto-perineal flap
2. Intestinal vaginoplasty:
   a. Sigmoid vaginoplasty
   b. Right colon vaginoplasty
3. Clitoroplasty with innervated glans penis flap
4. Labiaplasty with urethral flap

CONCLUSION: Surgery is a proven therapy for individuals with gender dysphoria and optimal outcomes occur in multi-disciplinary settings.

Abstract #63

Supermicrosurgical Lymphaticovenular Anastomosis for Treatment of Lymphedema - the Iowa Experience

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PURPOSE: Lymphedema is a progressive, often debilitating condition that affects many cancer survivors in U.S. Recent advances in microsurgery and supermicrosurgery created promising procedures in treating this challenging condition. These novel lymphedema surgical procedures, however, require specialized equipment and complex surgical technique, and may not be feasible or practical for many plastic surgery units. We describe our experience in initiating and developing a lymphedema service line in our institution.

METHODS: All patients undergoing lymphedema surgery between August 2013 and November 2014 were included in the study. All were assessed qualitatively and quantitatively with patients' self-reported symptoms, physician exam, volume-based measurements, and indocyanine green lymphography. The disease severity was staged clinically using the Campisi classification and lymphographically using the Dermal Backflow classification. Patients were assessed preoperatively and at regular postoperative time intervals.

RESULTS: A total of 269 LVAs were performed in 25 patients. VLNT was performed in 3 patients. Preoperative lymphedema severity ranged from Campisi stage II to IV. There was no postoperative complication in the LVA group. One VLNT patient required reoperation for flap salvage. All of the LVA and VLNT patients experienced prompt symptomatic relief. All demonstrated evidence of disease regression, both clinically and lymphographically. The LVA procedure was found to be efficacious not just in the patients with early disease, but those with late disease as well. We also described multiple technical modifications to the standard technique that help to improve surgical outcome and decrease the demand for expensive equipment.

CONCLUSION: Advanced lymphedema surgery is feasible and can be routinely offered even for smaller plastic surgery units such as ours. Increased performance of these procedures more microsurgeons would accelerate the further development and optimization of these novel techniques.

Abstract #64

Vestigial Breast Mounds along the Embryologic Mammary Ridge in Lean Young Men

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PURPOSE: Clinically, we observed that lean men seeking liposuction consistently had focal fat mounds extending from axilla to groin. As these same sites undergo lipohypertrophy in longstanding HIV, we hypothesized that subpopulations of adipocytes distinct from general subcutaneous fat exist in mounds along the embryologic mammary ridge.

METHODS: A grid-mapping technique fixed to bony landmarks was designed to establish X- and Y-coordinates on the anterior surfaces of 10 lean healthy men (average fat content 8.3%), permitting standardized data collection/plotting regardless of body proportions. During isometric contraction, rectus segments were mapped in red. Calipers determined pinch-thickness in each grid cell. Fat mounds were plotted onto skin grids with brown ink.

RESULTS: Paired mounds were found in the following loci: axilla(100%), lateral chestwall tail(70%), subareola(100%), anterior chestwall(100%), upper abdomen(100%), lower abdomen(100%), pubis(100%), anteromedial thigh(100%), and mid-medial thigh(30%). No other anterior fullness was present. The thickest points in transverse rows plotted into a curvilinear array extending from axilla to groin bilaterally ($p = 0.0002$, Table 1) in a configuration identical to the well-described embryologic mammary ridge. Hyper-elastic skin was also consistently identified along the same line. Individual moles and clusters of hairs were commonly seen atop the fatty mounds (suggestive of vestigial nipples), though a larger sample size is needed to establish significance of these less-common entities. Fat mounds located between rectus segments consistently decreased visibility of muscular definition (Figure 1). Mounds located directly over rectus segments enhanced definition.

CONCLUSIONS: Subtle fat mounds consistent with vestigial breasts run along the milk line in men in a configuration analogous to teats in other mammals, suggesting there are at least 2 subpopulations of subcutaneous adipocytes. Clinical implications and differential cytologic properties should be elucidated. Locations of these small mounds have impact on perception of muscular form. Studies in lean women are nearing completion.

Subject	Ridge	Non-Ridge
1	8·30±1·97	5·90±2·08
2	7·30±1·13	5·40±1·22
3	10·20±3·57	5·40±2·30
4	18·60±5·11	9·10±5·50
5	11·10±3·48	5·10±3·06
6	13·30±3·41	7·70±2·69
7	6·90±1·86	4·80±1·49
8	6·90±2·44	3·70±2·25
9	9·90±3·04	5·40±2·62
10	11·40±3·29	7·70±3·85

TABLE 1.