



**ASPN/ASRM Combined Scientific Paper Session
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ASPN #1 Pain after Breast Surgery Related to Intercostal Nerves

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Purpose: Breast procedures are amongst the most common surgeries done by Plastic Surgeons. While most aspects related to augmentation, reduction and reconstruction have been described well, prevalence of post-operative, persistent pain remains unknown and outcomes related to surgical approaches remains unreported. Our experience has been that persistent post-operative breast pain is related to the intercostal nerves, and the purpose of this presentation is to increase awareness of the existence of this problem and approaches to relieve this pain.

Methods: A retrospective analysis of the patients of four surgeons involved with peripheral nerve surgery was done. Descriptive analysis was utilized. The cohort contained 11 patients stratified according to the index surgical procedure: augmentation (3), reduction (1), lumpectomy (1), reconstruction (6). Outcomes were assessed with a numerical analog score, with a minimum pain score improvement of > 3 out of 10 points. Physical examination demonstrated painful trigger points along the pathway of one or more intercostal nerves. Prior to surgery, each patient improved > 5 points after a xylocaine/Marcaine local anesthesia block of the suspected intercostal nerves. At surgery, one or more intercostal nerves were resected and implanted into adjacent muscles (serratus or latissimus).

Results: At a mean of 22.3 months (3 to 58 month range), there were 6 excellent, 3 good, and 2 poor results. Intercostal nerves resected included the intercostal-brachial (5 patients), 3rd (10 patients), 4th (6 patients), 5th (9 patients), 6th (7 patients), 7th (1 patient). Multiple intercostal nerves were resected as follows: 2 nerves (6 patients), 3 nerves (3 patients), 4 nerves (1 patient), 5 nerves (1 patient). There were no post-operative complications.

Conclusions: Intercostal neuromas can be the source of breast pain following Plastic Surgery procedures. The same clinical and diagnostic approach can be used in patients with breast pain as in patients with upper or lower extremity pain. Plastic Surgeons whose practice pattern includes breast surgery should be aware of hope for their patients with chronic post-operative pain by applying a Peripheral Nerve Surgery approach.

ASPN #2 Influence Of Surgical Video Education On Operative Efficiency And Competency In Novice Surgeons: A Randomized Controlled Trial

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Purpose: Surgical training adheres to an apprenticeship model and requires countless hours of training for a surgeon to learn and perform a technical procedure with proficiency. With the implementation of the 80-hour work week and other factors, there has been increased pressure for residents to learn efficiently and become technically competent in more limited time. Video education is a potential new method of surgical training, yet the direct procedural implications of instructional videos have not been assessed. The purpose of this study is to quantify the educational impact of the instructional surgical videos on residents when performing a procedure independently.

Methods: After obtaining institutional review board approval, study participants were recruited from surgical residents in their first/second year of their residency to perform a carpal tunnel release (CTR) as the primary surgeon in a cadaver model. No previous experience with the CTR surgery was allowed.

Participants completed a number of steps, including a pre- and post-intervention survey (to assess baseline knowledge) and an objective assessment of baseline surgical skill. Participants were randomized to one of three study intervention groups: (1) surgical textbook, (2) surgical video, and (3) surgical textbook and video. Following the intervention, they performed a videotaped carpal tunnel release in a cadaver model. Blinded reviewers graded participants on a previously validated global surgical skill and technique scale, and then CTR-specific factors (placement of incision, degree of release, and presence of collateral damage) were reviewed. Following the cadaver operation, participants graded themselves on the two scales of operative performance for comparison and were administered a post-procedural survey on their learning experience.

Results: Quantitative results are pending. Preliminary data strongly suggest that novice surgeons who were administered the surgical video intervention demonstrated a significant advantage over those who were administered the surgical textbook alone. We anticipate differences in technical efficiency, competency, and retention of step-by-step knowledge of the procedure.

Conclusion: Surgeons are time-pressured individuals that require an efficient and effective resource that describes the technical nuances of a procedure. While traditional text resources are today's standard, surgical videography is becoming more mainstream due to the recent adoption and integration of new camera technologies in the operating room and the advantages of this more visual and efficient learning experience. Further advances in surgical video education could ultimately have distinct implications for continuing medical education as well as resident case preparation, technical knowledge, and patient outcomes.

ASPN #3 Secondary Surgery following Gracilis Muscle Transplantation for Facial Paralysis in Children

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Introduction: There is a paucity of literature on revision and ancillary procedures conducted in children following gracilis muscle transplantation for facial paralysis using cross-face nerve graft or motor nerve to masseter muscle. The purpose of this study was to characterize the secondary surgical procedures conducted at a single tertiary urban paediatric hospital in children following gracilis muscle transplantation for facial reanimation.

Materials and Methods: A retrospective case series was conducted on all children born after January 1979 that required secondary surgery following gracilis muscle transplantation that was performed prior to January 2014. Surgical procedures were categorized into 1. complete revisions of either the cross-face nerve graft or gracilis free flap, and 2. ancillary procedures for aesthetic and functional concerns. Secondary procedures related to immediate post-op swelling, infection or abscess drainage were excluded.

Results: Twenty-seven children required secondary surgery. Twenty-two (81%) patients had primary reconstruction of the gracilis muscle transplantation using cross-face nerve graft, and 5 (19%) had motor nerve to masseter muscle. There was no difference in the distribution of children with respect to the location of initial surgery and etiology (acquired or congenital) between the two surgical approaches. However, a higher proportion of males and bilateral cases had masseter-innervated gracilis transplantation. Thirty secondary procedures were conducted on the 27 children. Average age at the time of surgery was 11.6 + 4.4 years (5.1 - 19.4 years). Eighteen procedures (60%) were conducted on children who had primary surgery for facial reanimation at an outside institution. Sixteen (53%) complete revisions were conducted: 4 isolated cross-face nerve graft and 12 gracilis flap with or without revision of cross-face nerve graft. Complete revisions were not required for masseter-innervated cases. Fourteen ancillary procedures were conducted including debulking, adhesiolysis, scar revision, and muscle repositioning.

Conclusion: Complete revisions and ancillary procedures following paediatric gracilis muscle transplantation were equally common. This series included children referred to our centre after their primary procedure. Complete revisions were required following cross-face nerve graft and gracilis muscle transplantation, but not in cases that used the motor nerve to masseter muscle to innervate the gracilis.

Introduction: Periarterial sympathectomy is a proposed surgical treatment for patients who fail medical management of Raynaud Syndrome, however there is little agreement regarding the indications or extent of dissection. Due to the segmental nature of arterial sympathetic innervation, we routinely perform an extended periarterial sympathectomy which includes adventectomy of the ulnar artery starting 8-10cm proximal to the wrist crease (including the nerve of Henle), the superficial arch, common volar vessels, 3-5mm of the proper digital arteries, and the dorsal radial artery through the anatomic snuff box to the first dorsal interosseous muscle. This is done in concert with vein graft reconstructions of occluded radial or ulnar arteries. The purpose of this study is to examine the outcome of extended periarterial sympathectomy in our patients. We hypothesize that the majority of patients, after failing medical management, will demonstrate improvement in ischemic pain and sensibility, along with healing of digital ulcerations.

Methods: A retrospective chart review was performed on 40 patients who underwent 48 periarterial sympathectomies (8 bilateral) since 1980. The data collected include: demographics, comorbidities, previous therapy, operative details, and surgical outcomes. Additionally, we contacted available patients for a phone survey.

Results: Of the 48 cases, 64.6% were female, 43.8% were former or current smokers, and 50% had known connective tissue disease. Vein graft reconstructions were performed in 21 of 25 cases with radial or ulnar artery occlusions. Ischemic pain improvement was reported in 93.8% of cases, and 66.7% completely healed all digital ulcers or amputation stumps after a single operation. Of the 31 cases where amputation was unnecessary (64.6%), 21 had Semmes Weinstein Monofilament (SWM) testing data available. For the most symptomatic finger tip, mean SWM sensibility improved from 4.37 preoperatively, to 3.48 postoperatively ($p=.0009$). Mean follow-up was 2.6 years. Of 6 patients contacted by telephone, all reported a decrease in frequency and severity of Raynaud attacks, while 5 of the 6 patients reported a decrease in pain.

Conclusions: Extended periarterial sympathectomy is an effective procedure for ischemic pain and digital ulceration in patients with Raynaud Syndrome who fail medical management. Our data demonstrate long-term improvement in ischemic pain and sensibility, along with a high rate of ulcer healing and patient satisfaction. Patients with Raynaud Syndrome, and their health care providers, should be educated regarding the potential benefits of periarterial sympathectomy to optimize outcomes for this challenging condition.

ASRM #2 Facial Nerve Axonal Analysis and Anatomic Localization of Donor Nerve - Optimizing Axonal Load for Cross Facial Nerve Grafting in Facial Reanimation

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Introduction: Several variables may affect aesthetic and functional outcomes of the cross facial nerve graft followed by a free muscle transfer for facial reanimation. Previous studies by independent groups demonstrated that among the more important variables effecting improved outcome was axonal load of the donor nerve. Axonal counts of 900 and above correlated to improved function but localization of this point along the nerve has not been previously described. This study attempts to measure the axonal counts of the facial nerve branches innervating the zygomaticus major muscle at multiple points along their paths to determine the ideal anatomic location for harvest.

Methods: 14 fresh unpreserved cadaveric heads (28 hemi-faces) were dissected to expose the facial nerve from the stylomastoid foramen to terminal branches into the mimetic muscles. The zygomatic branches were harvested in 2 cm sections from the pes anserinus to muscle insertion, noting the position of the nerve relative to anatomic landmarks (zygomatic arch, posterior border of ramus, lateral border of zygomaticus major, and the parotid gland) at each point. Nerve samples were paraffin fixed, sectioned, and stained with SMI-31 anti-neurofilament stain, thereafter scanned and analyzed for axonal counts using an Aperio Digital Pathology scanner and ImageScope software (Leica Biosystems Inc., Buffalo Grove IL). Manual verification of counts was carried out on a randomly selected sample of nerve sections. Data analysis was carried out in Microsoft Excel (Microsoft Corp, Redmond WA).

Results: The mean axonal number at the pes anserinus was 4220. Every facial nerve specimen had multiple branches innervating the zygomaticus major. 27 of 28 specimens had at least one extra-parotid zygomatic branch with greater than 900 axons—10 specimens had one branch, 16 had two and one specimen had three branches. A branch with greater than 900 axons could be found at a mean of 46mm anterior to the posterior border of the ramus, 13mm below the arch, and 14mm from the lateral border of the zygomaticus major. The likelihood of finding an adequate branch in a 30x20mm rectangle around this mean location (i.e. 30 to 60mm from the posterior border of the ramus and 5 to 25mm below the arch) was 85%.

Conclusion: Zygomatic branches with adequate axonal load as donor nerves for facial reanimation procedures can be found in most specimens. Intraparotid dissection is rarely necessary. Branches with adequate axon counts can be reliably found within the 30x20mm area described above.

ASRM #3 Sensory Recovery in Neurocutaneous Flaps for Heel Reconstruction Using End-To-Side Neurrorhaphy

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Purpose: To retrospectively investigate the outcome of sensory recovery in neurocutaneous flaps after reversed transferring for foot heel reconstruction and end-to-side neurrorhaphy.

Clinical Materials: Eleven foot heel defect patients were included for the study, with the age ranged from 24 – 45 and averaged 32 years old. Of these, 9 suffered from traumatic defect, and 2 for congenital reason (myelomeningocele). The sural nerve, which was isolated and incised about 5 cm long proximally to the flap, after conventionally reversed transferring of the flap to the heel, was end-to-side anastomosed to the tibial nerve (with windowed) at the medial ankle. Ten patients were followed-up for at least 6 months. All the flaps were survived. The sensory recovery was assessed by patient satisfaction and static two-point discrimination.

Results: Sensory recovery began at one month after operation, and at 6th month, the two-point discrimination was 1.5 ± 0.3 cm. the patient satisfactory rate was high.

Conclusion: Sensory reconstruction by end-to-side Neuroorrhaphy for distally-based neurocutaneous flaps for foot heel repair is a reliable method.