address the complex molecular environment of a regenerating nerve required for complete functional restoration. Current literature indicates that widely used pharmacological agents botulinum toxin A (BTX, a neurotoxic protein) and nimodipine (NDP, a L-type calcium channel blocker) may improve functional recovery of injured nerves, but these agents have not been studied together. This research investigates BTX and NDP, independently and in combination, for their novel capacity to improve neural regeneration and functional recovery following neurorrhaphy.

**METHODS:** Thirty-two Lewis rats underwent surgical tibial nerve transection and neurorrhaphy. Post-op pharmacological treatment groups included: (1) Sham surgery (n = 4); 2) Sham surgery + BTX (n = 4); (3) NDP + saline injection (control for BTX, n = 6); (4) BTX+NDP (n = 6); (5) Saline + placebo pill (control for NDP, n = 6); (6) BTX + placebo pill (n = 6). Outcomes were assessed using behavioral (rotarod, horizontal ladder walk), electrophysiological (CNAP, CMAP velocity and duration), and stereological means (myelinated axon count estimation, myelinated axons density). Statistical significance was determined by 1-way ANOVA.

**RESULTS:** The NDP + saline group outperformed other treatment groups in the ladder walk, resulting in the fewest deep slips (15.07% versus 30.77% in BTX + NDP; P = 0.117), fewest misses (3.54% versus 4.21% in BTX + NDP; P = 0.809), and most correct steps (70.53% versus 55.58% in BTX + NDP; P = 0.143). Rotarod testing resulted in no clear differences between treatment groups with all groups performing worse than sham controls. There was an observed sex bias between groups in which females tended to outperform males within groups in both behavioral modalities, but this was stronger in rotarod testing. Electrophysiological testing portrayed similar outcomes to ladder walk testing in which NDP + saline resulted in the fastest NCV (0.81 versus 0.59 m/s in BTX + NDP; P = 0.126), shortest duration of response (104.17 versus 326.39 μs in BTX + NDP; P < 0.05) among the treatment groups. Our blinded stereological analyses resulted in the BTX + NDP group having the highest myelinated axon count (9249.54 versus 7334.94 in NDP + saline; P < 0.05), but when epineurial area is controlled for, this difference diminishes (0.005/μm² versus 0.0043/μm² in NDP + saline; P = 0.201). When separated by sex, males tended to have higher axon counts than females (8615.03 versus 6052.84 in NDP + saline; P < 0.05).

**CONCLUSIONS:** This pilot study represents the first approach to test NDP with BTX in a multimodal assessment of nerve recovery and regeneration following transection and neurorrhaphy. While an additive or synergistic effect between BTX and NDP was expected, NDP alone tended to outperform the combined treatment group in behavioral and electrophysiological assessments. However, and mirroring past studies by our group and others, histologic axon count was inversely related to nerve function recovery, portraying an expected regenerative effect after injury. Our findings of a sex bias parallel observations present in the current literature. Future work will expand on these studies focusing on nimodipine in males and females in an effort to improve nerve recovery in trauma patients.

**Reducing Complications and Expanding Utilization in Robotic Rectus Abdominis Muscle Harvest for Pelvic Reconstruction**

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**PURPOSE:** Reconstruction of perineal defects has long relied on the rectus abdominis flap. While traditionally approached through an external incision, the morbid nature of the incision and violation of the anterior rectus sheath has led to the development of robotic techniques for harvest. However, these procedures have been limited by surgeon comfort with minimally invasive techniques, cost of additional equipment, and minimal outcomes data. In this study, we present our experience, evaluation, and comparative outcomes of robotic rectus abdominis muscle (RRAM) against nonrobotic flaps for perineal reconstruction.

**METHODS:** A retrospective review RRAM flaps were compared with nonrobotic perineal reconstruction techniques during a 6-year period. Descriptive statistics and complication profiles were computed. The evolution and details of our surgical technique including routine use of the posterior fascia for inset, dissection in the setting of previous ostomies, donor site mesh repair, and protocol for flap selection are explored.

**RESULTS:** Thirty-six patients underwent perineal reconstruction. Sixteen were performed utilizing the RRAM, and 20 with traditional repairs; 12 vertical rectus abdominis myocutaneous flaps and 8 gracilis flaps. Demographic profiles were similar between cohorts including age, BMI,
smoking status, history of diabetes, neoadjuvant radiation, and need for vaginal wall repair. Six robotic patients underwent abdominal wall reinforcement with biologic mesh after 2 instances of hernia/bulge in nonrepaired patients. Surgical times were similar between robotic and nonrobotic cohorts with on average 7-hour surgical times including both extirpation and reconstruction (428 versus 422 minutes; \( P = 0.84 \)). Length of stay and incidence of major complications were similar between cohorts with a trend toward increased minor complications in traditional reconstructions (55% versus 31%; \( P = 0.15 \)).

CONCLUSIONS: Robotic rectus abdominis muscle harvest is a technique that continues to evolve with the potential to ameliorate morbidity and complications of traditional repair and enhancement of cosmesis. Our series explores the largest comparative experience of robotic rectus harvest for perineal reconstruction in the literature which has allowed us to identify risks for complications and refine the indications and technique for robotic harvest. This evolution of our protocol reflects our belief that a skin paddle can be avoided in almost all cases when laparotomy is avoided with the use of the posterior rectus fascia for pelvic floor recreation and/or posterior vaginal wall reconstruction and subsequent prophylactic mesh repair of the donor defect.

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Cure for Lymphedema: Myth or Reality

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INTRODUCTION: Recent advances in lymphatic supermicrosurgery have increased the hope for patients with limb lymphedema. However, it remains unclear if this procedure fundamentally impacts the disease course. The aim of this study is to investigate whether full reversal of lymphedema disease state, or cure, is feasible.

METHODS: All LVA cases performed by the senior author between January 2014 and January 2018 were reviewed. Surgical outcomes were tracked with patient report, clinical examination, limb volume measurement, and indocyanine green (ICG) lymphography. The evaluation was performed preoperatively and postoperatively at 3, 6, 12 months, and then annually. The state of cure was defined as an edema-free state without compression.

RESULTS: Ninety-seven patients underwent to LVA during the study period. All demonstrated improvement based on the four parameters evaluated. Sixteen patients (16.5%) achieved cure at 1 year following surgery. Of these patients, 15 patients were females and 1 was male. The average BMI, age, and follow-up period were 27.18 ± 4.92 kg/m², 59.5 ± 9.30 years, and 45.5 ± 12.1 months, respectively. Eleven patients had Campisi stage III, 4 had stage II, and 1 had stage IB disease. Fourteen had arm and 2 had leg disease. At the conclusion of the study, all 16 patients achieved to stage IA, or no clinically appreciable limb edema. All 16 patients also demonstrated correlating ICG lymphographic evidence of improvements, whereas 3 patients demonstrated complete resolution of pathologic lymphographic patterns—no evidence of disease was seen on their ICG lymphography.

CONCLUSION: Full reversal of lymphedema disease state in patients with limb lymphedema is feasible following supermicrosurgical intervention. In these patients, correlating improvement can be seen on postoperative ICG lymphography. The full disease reversal is seen more frequently in arm than in leg lymphedema. Further studies are necessary to investigate the inconsistency in surgical outcomes.

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