staining revealed 2.32 times more α-SMA fluorescent staining in skin expanded for 1 day (p = 0.0065) and 2.19 times more α-SMA fluorescence in skin expanded for 7 days (p = 0.0047). The increase in number of α-SMA positive cells were mostly observed in the outermost 400µm of papillary dermis. Histological staining showed minimal collagen morphological changes in both the papillary and reticular dermis after 1-day of expansion. However, shortening of fibril length, increased density, and increased disorder were observed in the papillary dermis collagen after 7-days of subtle expansion.

5 Correlation Of Face Transplant Smile Excursion Measurements With Emotional Evaluation By Artificial Intelligence

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Purpose: Examining the outcomes and progression of face transplants has expanded to include the recent advancements in artificial intelligence. This novel methodology has allowed for the objective exploration of emotional expression. To our knowledge, this examined emotional expression has yet to be correlated to the hypothesized functioning of the allograft. We have combined the result of the AI software with a software analyzing smile excursion; demonstrating the progression of the allograft in our face transplant patient. This study helps illuminate the software possibilities for objective measures in transplant progression.

Methods: Images were analyzed from our face transplant patient post-operatively at approximately 6-month intervals for four years. The still images for each time interval include both a neutral facial expression and a full-face smile with teeth. The images were taken from video clips of the patient and then analyzed using the FACEgram software (Hadlock & Urban, 2012). The measurements of the smile excursion were standardized based off of the pupil diameter and excursion was measured relative to the neutral expression of each time period. The emotional expression data was acquired using FaceReader AI software from Noldus Information Technology (Wageningen, The Netherlands). The emotional analysis was done on 2 second clips from clinical videos of

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ICG-Fluorescence Lymphography After Immediate Lymphatic Reconstruction

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Purpose: Immediate lymphatic reconstruction (ILR), performed at the time of axillary lymph node dissection (ALND), has demonstrated promising reductions in the development of breast-cancer associated lymphedema. However, questions remain regarding the effects of adjuvant therapies on the continued patency of the lymphaticovenous anastomosis. The aim of our study is to assess
lymphographic outcomes, including ICG pattern and LVB patency, following axillary ILR in patients at high risk for breast cancer associated lymphedema.

Methods: Baseline ICG studies of 15 patients who underwent ILR were compared to studies obtained during secondary stage breast reconstructive procedures to assess for any changes in lymphatic morphology and transit in the at-risk arm.

Results: All 15 patients in this study demonstrated linear lymphatic flow in intra-operative lymphography studies performed during the initial lymphatic reconstruction. An average of 2.4 (range 1-4) LVBs were performed per patient. Only 1 patient in this study group had preservation of in-continuity lymphatics at time of ALND. Followup lymphographic studies showed clear, linear lymphatic transit in 12/15 patients. Of these 12 patients, an average of 2.5 LVBs were performed, 10 received chemotherapy (7 neoadjuvant, 3 adjuvant), and all 12 received post mastectomy radiation (PMRT). Dermal backflow patterns of varying severity were recorded in 3/15 patients, two of whom showed signs of lymphedema prior to their followup study and the last went on to develop clinically detectable lymphedema. Of these 3 patients, an average of 2 LVBs were performed, all received chemotherapy (2 neoadjuvant, 1 adjuvant) and 2/3 underwent PMRT. Of the 12 patients that remain lymphedema-free, 7 post-operative studies demonstrated clear visualization of linear ICG flow from the lymphatics of the arm into the axilla without evidence of lymphatic collateralization. An average of 3 LVBs were performed in this group and 100% of these patients received adjuvant radiation.

Conclusion: We have demonstrated that ICG lymphography can be implemented as a post-operative tool to assess lymphatic function in patients who have undergone ILR in the axilla. Post-operative imaging studies in the majority of patients demonstrated linear ICG flow with evidence of lymphatic contractility and velocity similar to baseline studies obtained at the time of lymphadenectomy and ILR. Additionally, ICG flow patterns through the axilla in post-operative imaging studies provided visual evidence supporting sustained LVB patency despite inflammation and tissue fibrosis associated with axillary irradiation.

QUICK SHOTS

QS1

Pre-implanted Nerve Grafts (PING) to Improve Functional Outcomes in VCA

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Purpose: Improved graft reinnervation and functional recovery would greatly enhance the utility of vascularized composite allotransplantation (VCA). Pre-implantation of nerve grafts in a limb transplant recipient prior to transplantation to increase the length of the severed nerves in the amputation stump offers a novel, readily translatable approach to this problem. At the time of transplantation a pre-implanted nerve graft (PING) would be elevated from its wound bed in the amputated stump and unfurled distally into the transplanted limb, allowing for a more distal nerve coaptation.

Methods: We used a reversed sciatic-tibial nerve isograft coapted end-to-end to a median nerve in a rat to: (1) determine viability of distal axons after elevating PINGs; and (2) assess for ischemic injury to axons in the distal PING following elevation from the wound bed. For axonal viability, grafts of varying lengths (2cm,3cm,4cm, n±5/group) were left to regenerate for 8 weeks. The distal ends were then biopsied prior to elevation, and again one week after elevation. For ischemia assessment, blood flow along 4cm long PINGs was measured with laser doppler at multiple timepoints: baseline (at time of grafting), 8 weeks after grafting (before elevation), immediately after elevation, and 3 and 7 days post-elevation (n=8/timepoint). Means were compared with t-tests and ANOVA. A pig forelimb model was used to assess the functional impact of PINGs. A 6cm long reversed ulnar-PING was coapted to the proximally transected ulnar nerve. After 12 weeks of regeneration, the distal PING was transferred end-to-end to the median nerve just proximal to the elbow. A control group underwent ulnar-to-median nerve transfer 6cm proximal to the elbow (n=4 limbs/group). Hoof flexion force was measured every three weeks.