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PURPOSE: In recent years, the anterolateral thigh (ALT) flap has become a workhorse flap with widespread indications. Lower extremity salvage rates have dramatically increased as a result. However, use of the ALT as a neu-rotized or re-innervated flap capable of restoring sensation in lower extremity reconstruction has been widely under-reported in the literature.

METHODS: We performed a retrospective review of all lower extremity (LE) reconstructions between 2013 and 2015 performed by the senior author. Anterolateral thigh flap reconstructions that employed neurorrhaphy of the lateral femoral cutaneous nerve (LFCN) to a recipient site peripheral nerve were identified and selected for inclusion. Sensory testing was performed on the flaps at follow up visits.

RESULTS: A total of 15 lower extremity free ALT flaps were identified, 10 of which were neurotized free ALT flaps and eligible for inclusion. The mean age at time of reconstruction was 41.6 (range 7.1 - 56.7) years, with a male predominance of 80%. The mean operative time was 740 (range 113 - 1110) minutes, and mean length of hospital stay was 14.3 (range 7 - 31) days. Of the 10 procedures, the mean flap size was 186.6 (range 23 - 324) cm². Trauma (n=6), infection (n=3) and tumor extirpation (n=1) were the most common indications for salvage. Average follow-up was 174.25 days (range 72–555 days). There was a 100% limb salvage rate, and there were no cases of total or partial flap loss. There was one (n=1) tumor recurrence at a site distant from the primary resection. Return of protective sensation was evaluated via Semmes-Weinstein Monofilament, two-point discrimination, and light touch testing. Protective sensation (two point discrimination < 15 mm) was regained in 3 of 7 patients (43%). Light touch returned partially or fully in 6 of 7 patients (86%). Those with segmental or no return of sensation were of shorter duration of follow-up.

CONCLUSION: Neurotization of the ALT flap with the LFCN can restore protective sensation in complex lower extremity reconstructions, which will potentially reduce the complications related to insensate flaps in the foot and leg. Minimal donor site morbidity, a long vascular pedicle, the option to include muscle or fascia, and the ability to provide sensory re-innervation to the lower extremity make the neu-rotized ALT free tissue transfer an ideal flap for use in lower extremity reconstruction.

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QS15

Evaluating the Best Use of 3D CT Angiograms in Free Abdominal Breast Reconstruction: Do fewer perforators correlate larger vessels?

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PURPOSE: Autologous Microvascular Breast Reconstruction at the present time revolves around abdominal based Free Tissue Transfer. A 3D CTA is a commonly used in preoperative planning to identify the perforators and intact pedicle supplying the proposed flap. Based on flow mechanics one would hypothesize that as the number of perforators increase that the average size of each of the given perforators would decrease.

METHODS: One hundred charts of patients who underwent free abdominal breast reconstruction were reviewed, specifically examining CT angiograms with 3D reconstruction. The following data was collected: quantity, locations, and diameters of perforators, patient BMI, and pre-operative blood pressure. A sub group of Perforators within 3 cm superior and 5 cm inferior to umbilicus were of special interest, as this anatomical region is most commonly used for DIEP flaps. A Pearson correlation coefficient and Students Two sided Test were used to evaluate the data.

RESULTS: Contrary to our original hypothesis, we found that as perforator number increased as did the average perforator size (Pearson correlation coefficient of 0.31 on the left and 0.17 on the right, CI 99.9% and 95%). This led us to investigate the relationship of pre-operative BMI and mean arterial pressure with average vessel diameter. A larger BMI resulted in a larger average vessel diameter (Pearson correlation coefficient of 0.293 for the left and 0.286 on the right with CI of 99.5% for both). Blood pressure showed no statistical correlation with vessel size or number. One of
the strongest and most unique findings was the correlation between vessel diameters in our subgroup and the total vessel number from the DIEA.

CONCLUSION: The evaluation of the CTA and data revealed several interesting findings. It would make sense that there is no correlation between vessel number and BMI as perforators must pierce the fascia to supply the abdominal soft tissue and it would be difficult to believe this value changes throughout a patient's lifetime. However, the correlation between vessel number and diameter was not inverse as initially proposed, it was the opposite. Vessel Diameter increased with BMI to most likely meet the demands of increased blood flow required to supply the larger amount of abdominal soft tissue. The subgroup (area most likely used to harvest an abdominal free flap perforator) correlated strongly with BMI and strangely with overall number of perforators on its respective side, but not with the number of perforators within the zone. These findings can help in surgical planning for free abdominal flap reconstruction.

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QS16

Co-culturing Human Adipose Derived Stem Cells And Schwann Cells On Spider Silk - A New Approach In Nerve Regeneration After Peripheral Nerve Injury

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PURPOSE: Innovative options for nerve reconstruction after peripheral nerve injury are of great interest in plastic and reconstructive surgery. Treatment of nerve defect injuries by autologous nerve transplantation represents the gold standard when a tension free end-to-end coaptation is not achievable. However, with regard to donor site morbidity, nerve availability is limited. Recently, many studies focused on finding valid alternatives. Nerve conduits made of biodegradable materials were developed to guide and redirect proximal nerve growth. These conduits can be seeded with cells to improve recovery. Schwann cells represent the key to nerve regeneration by producing extracellular matrix molecules, integrins and trophic factors. Since clinical use of isolated Schwann cells is limited due to donor site morbidity and slow growth in vitro, adipose derived stem cells (ADSCs) have been identified as viable alternative. Compared with other stem cells, ADSCs can be harvested by less invasive procedures (e.g. liposuction) and cultured with a greater proliferation rate. As shown in many studies ADSCs provide the potential to differentiate into several functional cell types (e.g. adipocyte, osteoblast, chondrocyte and neural phenotypes) and are therefore of high interest for research purposes. Additionally, ADSCs secret multiple growth factors and cytokines, which might further support and enhance the regeneration process of injured nerve axons. The use of spider silk could provide an additional guidance tool to improve regeneration after peripheral nerve injury. With its biocompatibility, it doesn’t need any modifications to its applications. Studies using stem cells isolated from rats seeded on spider silk showed good results concerning proliferation and regeneration rates.

METHODS: Native spider silk harvested directly from Nephilia edulis was woven on a steel frame and sterilized by autoclaving. Human ADSCs were isolated from the liposaprit of healthy patients undergoing liposuction. Cells were characterized by immunostaining with monoclonal mouse and rabbit antibodies against CD90, CD44, CD34, CD45 as well as stro-1. Immunofluorescence showed positivity for CD90 and CD44, cells were negative for CD34, CD45 and stro-1. The human Schwann cells were isolated from the ischiadic nerve of an organ donor. After immunocytochemical staining cells were positive for anti-S100 in the immunofluorescence. After isolation and characterization 0.5 x 10^6 (50% ADSCs (passage 2), 50% Schwann cells (passage 1)) were seeded on spider silk.

RESULTS: In our experiment, human Schwann cells and human ADSCs were seeded in co-culture on spider silk, in order to combine the benefits of the silk and the ADSCs regarding improved proliferations and differentiation. Results so far showed that cells started to attached on the silk and aligned along the silk fibers. Proliferation could be observed starting in the corners where the fibers cross each other slowly stretching out over the mesh.

CONCLUSION: Silk as matrix for cell adhesion is of great interest for research on nerve regeneration. By seeding Schwann cells and ADSCs on the silk fibres regeneration and guidance of the healing nerve may be improved. Further experiments, control trials and analyses by characterization