

was independent of both flap size and skin paddle presence. In the context of higher failure rates among lower extremity trauma free flaps, our results suggest improved outcomes with fasciocutaneous tissue compared to muscle.

109

Obesity and the Anterior Abdominal Wall Vasculature: Does Weight Gain Influence Perforator Anatomy?

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PURPOSE: Given the national trends in obesity, reconstructive surgeons are faced with an increasing number of overweight and obese women interested in post-mastectomy breast reconstruction. While the link between obesity and worse postoperative outcomes is well-established, few studies have explored the influence of weight gain on the vasculature of the anterior abdominal wall.

METHODS: A retrospective, radiographic review was conducted of all female patients who underwent computed tomographic angiography (CTA) of the anterior abdominal wall between January 2009 and December 2013. CTA studies were evaluated for perforator quality and quantity. Patients were stratified by body mass index (BMI).

RESULTS: There were a total of 916 hemiabdomens included in the study. There was a statistically significant positive correlation between BMI and size of the flap ($p < 0.01$). There was no statistically significant correlation between BMI and deep inferior epigastric artery (DIEA) diameter or mean diameter of major (> 1 mm) DIEA perforators. There was a statistically significant negative correlation between BMI and number of major DIEA perforators ($p < 0.01$).

CONCLUSION: Despite the increased demands of excess abdominal adiposity, DIEA perforator caliber was unaffected by weight gain. That the number of major DIEA perforators decreased with increasing body weight may indicate either a limitation of CTA imaging protocols in overweight and obese patients or increased importance of the superficial inferior epigastric system.

110

Reverse Distal Transverse Palmar Arch in Distal Digital Replantation

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PURPOSE: Refinements in microsurgery have made distal finger replantation an established technique with high success rates and good functional and aesthetic outcomes. However, it still represents a technically demanding procedure due to the small vessel caliber and frequent lack of vessel length, requiring the use of interpositional venous grafts in some instances. The purpose of this study is to provide a technical description and the results of a new technique for arterial anastomosis in fingertip replantation, whereby the need for venous grafts is eliminated.

METHODS: At the level of the nail base, the ulnar and radial digital arteries anastomose, forming the distal transverse palmar arch. By ligating one side of the arch, we can mobilize it and turn it distally for anastomosis in the distal stump, or proximally for arteriovenous shunting. Applying this technique, eleven cases (6 males and 5 females; age range, 18–54 years) of distal digital replantation were performed between January 2011 and May 2016. This technique was used for arterial anastomosis in ten cases and arteriovenous shunting for venous drainage in one case. A retrospective case review was conducted. The technical description and clinical outcome evaluations are presented.

RESULTS: Ten of the eleven replanted digits survived, corresponding to an overall success rate of 91%. One replant failed due to venous insufficiency. Blood transfusions were not required for any of the patients. Ten cases remained in hospital and one case was managed on an outpatient basis. Follow-up (range, 1.5 to 5 months) revealed

near-normal range of motion (30–70 degrees) of the distal interphalangeal joint and good aesthetic results. All of the replanted digits developed protective sensation. The average length of hospital admission was five days. All patients were satisfied with the results and were able to return to their previous work.

CONCLUSION: The use of the reverse digital arterial arch is a novel and reliable technique in distal digital replantation when an increase in vessel length is required, allowing for a tension-free vessel repair without the need for vein grafts.

111

Rapid Detection of Acute Vascular Occlusion Using Oxygen Monitoring in a Rat Myocutaneous Flap Model

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PURPOSE: Free tissue transfer requires close postoperative monitoring for vascular occlusion. Vascular compromise commonly occurs in the immediate postoperative period in association with failure of the micro-vascular anastomosis. The resiliency of tissue to hypoxia and ischemia is crucial to the success of the surgery. It is estimated that 6 percent to 25 percent of skin flaps require a secondary surgical re-exploration and approximately 10 percent of flaps fail. Currently, all monitoring methods have limitations because they require an experienced operator, suffer

calibration difficulties and are expensive. Furthermore, many of these methods impose a significant delay between the time of vessel occlusion and its detection. In this study we introduce implantable oxygen sensors as a new method to detect acute vascular occlusion.

METHODS: Experimental sensors were made by incorporating benzo-porphyrin dye into a matrix of biocompatible hydrogel. These sensors were approximately 3mm-long, 1.5mm-wide, and 0.5mm-thick. Male Sprague-Dawley rats were used throughout the study. Sensors were implanted intradermally in the impending flap site. Inspired oxygen was modulated between 100% and 12% to qualitatively confirm sensor sensitivity. Superficial inferior epigastric artery (SIEA) myocutaneous flaps were surgically elevated. The SIEA flap was first outlined on the shaved skin of the right ventral abdomen by placing a 3 × 5cm square template based on the location of the superficial inferior epigastric vessels. These vessels were carefully dissected to create a 3 × 5cm island flap containing skin, subcutaneous fat, and panniculus carnosus muscle. Tissue oxygen tension (TOT) readings were obtained from implanted sensors both at baseline and during vascular clamping of the feeding blood vessels.

RESULTS: Tissue Oxygen Tension (TOT) measurements from the sensors were observed to modulate as expected by a magnitude that correlated with the changes in the inspired oxygen levels. Clinical observation of the flaps did not show any significant change in color and temperature of the flaps during or immediately after clamping of the feeding blood vessels. Real-time analysis of the sensors implanted in the myocutaneous flaps has demonstrated that acute vascular clamping of the feeding blood vessels in the pedicle were immediately detected within 70 seconds. (*p<0.05)

CONCLUSION: Oxygen monitoring in tissues is highly sensitive and can be specific for the detection of acute vascular occlusion. This approach is superior to clinical observation, faster than current standard of care methods and offers a cost-effective, and accurate means of monitoring free tissue transfers.