P30.

ULTRASONIC MAPPING OF THE ABDOMINAL WALL USING ARFI-SWV: A PROSPECTIVE TRIAL TO DETERMINE THE PHYSIOLOGIC BASIS FOR RECONSTRUCTION

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PURPOSE: Current indices of risk evaluation for abdominal wall reconstruction focus on thickness and fat measurements, but do not address abdominal wall elasticity and texture assessment. Acoustic-Radiation-Forced-Impulse-Shear-Wave-Velocity (ARFI-SWV) is a novel technology to assess skeletal muscle tissue characteristics. This technique has not assessed the abdominal wall physiology for reconstructive patients on a plastic surgery service.

METHODS: Texture analysis and ARFI-SWV of the internal and external oblique (IO and EO) were performed on 36 subjects. Ten subjects qualified as high-physical activity according to IPAQ guidelines, sixteen were awaiting abdominal wall reconstruction, and ten were age and BMI matched to the operative candidates.

RESULTS: When comparing the active vs. pre-operative patient’s abdominal wall constructs, significant differences were shown in pre-hepatic fat thickness (p=0.037), pre-peritoneal fat thickness (p=0.005), IO thickness (p=0.001), subcutaneous fat thickness (p=0.003), and SWV in IO (p=0.023) and EO (p=0.013). The matched patients showed significant differences to the pre-operative grouping in pre-peritoneal fat thickness (p=0.022) and IO thickness (p=0.03). Finally the active and matched group differed in EO thickness (p=0.005). Mean brightness EO and IO ratio of hernia patients (EO 2.29; IO 1.59) was greater than matched controls (EO 2.05; IO 1.3) as well as the active controls (EO 1.2; IO 0.82).

CONCLUSION: ARFI-SWV is an excellent technique to measure stiffness of the abdominal wall musculature, providing consistent results. Textural analysis has potential to predict abdominal wall weakness. The physiologic basis of the abdominal wall in reconstruction patients differs from healthy counterparts, contributing to eventual failure and need for repair.

P31.

CALCANEAL RECONSTRUCTION WITH MICROVASCULAR DOUBLE/SINGLE BARREL FIBULA OSTEOCUTANEOUS FLAP: A LIMB-PRESERVATION CASE SERIES

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PURPOSE: Calcaneal destruction commonly occurs in diabetics, and trauma (including warfront IED explosions). Calcaneal resection usually necessitates a below-knee amputation - the central weight-bearing mechanism is lost and reconstructive choices are limited.

METHODS: Here we present two cases of calcaneal reconstruction, using double/single-barreled fibular osteocutaneous free flap.

RESULTS: Two patients who underwent near-total calcaneotomy for osteomyelitis (complications from infected fracture-hardware) are described. Alternative to reconstruction was below-knee-amputation since wound care with chronic antibiotic suppression were unsuccessful. Reconstruction using a free fibular osteocutaneous flap was undertaken. Osteotomies were performed to create a double-barrel fibula, taking care to preserve periosteum. The tips of the fibula were shaped into pencil-tip cones that were then invaginated into corresponding conical cavities burried into the calcaneal remnant to wedge the double barrel fibula flap. This measure increased bone-to-bone contact promoting new-bone formation and increasing stability for weight-bearing. The orientation of the fibula vis-à-vis the heel was also carefully planned using physiologic models of weight-bearing in the adult foot. Nonsurgical donor-site wound complications and a partial skin-paddle loss occurred in one patient. Both patients healed unremarkably and are fully weight-bearing and ambulatory.
CONCLUSION: Calcaneal reconstruction is possible with free fibula bone and must be considered as an alternative to amputation. A double-barrel design with careful attention to orienting the fibula to closely resemble the anatomy of the weight-bearing posterior portion of the calcaneum allows for reconstruction of larger defects, creates a physiologic weight-bearing bone with excellent results. It is a useful alternative to limb loss.

P32.

THE SPLIT PECTORALIS FLAP: COMBINING THE BENEFITS OF ADVANCEMENT AND TURNOVER TECHNIQUES IN STERNAL WOUND RECONSTRUCTION
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PURPOSE: The pectoralis major is a versatile flap used as an advancement or turnover for sternal wound treatment. The advancement flap provides suboptimal inferior sternal coverage and poorly fills mediastinal dead space. The turnover flap covers the inferior sternum and fills dead space, but it requires disinsertion of the muscle from the humerus, resulting in function loss and cosmetic deformity.

METHODS: We describe a new technique of splitting the pectoralis muscle along its fibers, using the superior portion as an advancement flap and the inferior portion as a turnover flap.

RESULTS: Ten patients underwent the described technique. Nine patients healed without complications or repeat operations. One patient had a recurrent aortic graft infection requiring reoperation. One patient had a post-operative seroma requiring incision and drainage.

CONCLUSION: The split pectoralis flap combines the benefits and minimizes the drawbacks of both flaps. This technique provides coverage of the entire sternum without the necessity of an omental or rectus abdominis flap. While minimizing turnover flap morbidity and preserving the muscle’s function and cosmetic appearance, it provides obliteration of dead space in the lower one-third of the sternum and volume for mediastinal defects. Future studies will quantify and objectively analyze the functional and cosmetic benefits of this flap.

P33.

FREE MUSCLE GRAFT FOR ANAL SPHINCTER DEFECT: REVISITING THE PAST TO ADDRESS UNSOLVED RECONSTRUCTIVE DILEMMAS
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PURPOSE: Muscle graft use waned with the advent of microvascular free tissue transfer. Despite advances using muscle flaps, approaches for small muscle defects where free flaps is impractical is lacking. For example, the free tissue transfer cannot reconstruct the precise function and configuration of anorectal sphincters. We present a case of anal sphincter reconstruction with free muscle graft.

METHOD: A 48 year old male presents with a partial sphincter defect after resection of an invasive tumor of the posterior anal sphincter. Primary closure would have resulted in stricture. We utilized a free muscle graft from the gluteus maximus muscle embedded on an Alloderm carrier to restore the normal circumference of the sphincter.

RESULT: At 1 year follow up MRI showed reconstitution of the anorectal sphincter continuity.

CONCLUSION: We and others have identified and characterized the endogenous human muscle stem cells called satellite cells, which are responsible for regenerating muscle after grafting. Although early results with muscle grafting were promising, free muscle transfer overshadowed its development and technology then could not investigate the mechanism of muscle graft survival. Through deeper understanding of muscle regeneration by stem cells free muscle grafts may find renewed application in the armamentarium of the reconstructive surgeon.