

INTRODUCTION

Wounds of the lower extremity require adherence to a multi-factorial algorithm which provides patients with the greatest healing potential. Once the patient and wound have been optimized multiple treatment options are available for wound closures which respect the tenets of the soft tissue reconstruction ladder. A variety of factors play a role in determining which method of wound closure is best suited, the most important being wound location and topography. A retrospective observational chart analysis was performed of three consecutive patients status post local abductor digiti minimi muscle flap for supplementation of soft tissue defect closure about the foot. Definitive closure with a aide of local ADM muscle flap was performed and long-term follow-up was engaged.

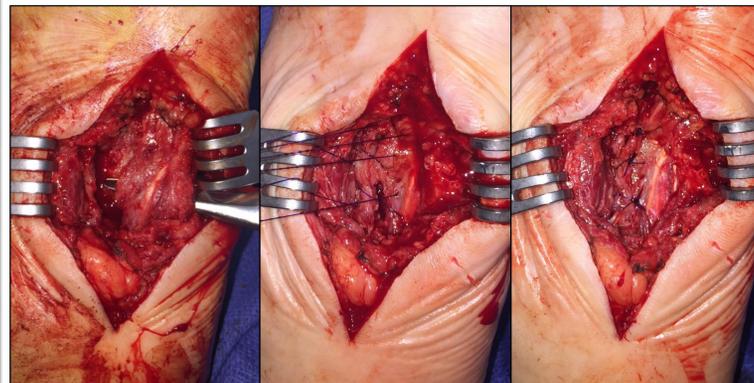
LITERATURE REVIEW

Ralph Ger pioneered soft tissue reconstruction in the lower extremity for post-traumatic and venous stasis wounds using pedicled soleus and flexor digitorum longus muscle flaps. Advances in anesthesia, antibiotics, and wound healing gradually popularized the use of local muscle flaps and in doing so improved outcomes.

Local muscle flaps are considered especially advantageous for bone coverage secondary to their robust vascularity. In the act of transposing the muscle it is freed from the surrounding tissues but left attached to its blood supply, thus enhancing chances of wound healing. Muscle flaps offer lower donor site morbidity than more complex regional and free tissue transfers, require shorter operative time, and require a less intensive postoperative course. Intrinsic muscle flaps are well-vascularized tissue flaps with adequate composition capable of filling soft tissue defects while having the ability to withstand the high impact forces of ambulation.

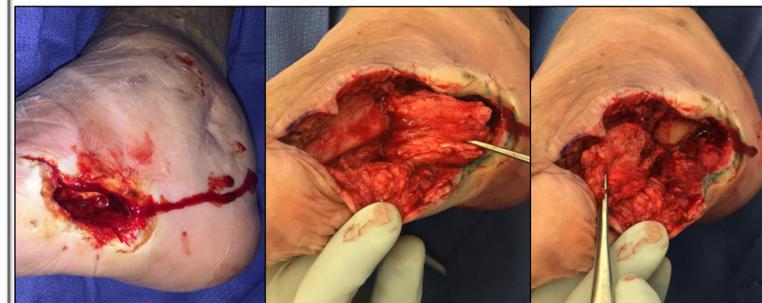
CASE #1

• A 63 year old male with PMH of DM Type 2 presented with a Left plantar foot ulcer and foot deformity. He was afebrile and without constitutional symptoms. Pedal pulses were palpable and the neurologic assessment confirmed loss of protective sensation. The plantar midfoot ulcer was a full-thickness with a hyperkeratotic border and a positive probe-to-bone test. Plain radiographs revealed hindfoot collapse consistent with Charcot Neuroarthropathy without evidence of osteomyelitis. The patient was placed on empiric broad-spectrum parenteral antibiotic therapy. Non-invasive vascular testing demonstrated no occlusive arterial disease.



• This patient underwent a staged debridement with plantar exostectomy of exposed calcaneus and underwent Abductor Digiti Minimi (ADM) muscle flap and primary closure of the plantar defect. The ADM muscle was identified along the lateral aspect of the wound and mobilized from its fascia and transposed to cover the existing plantar calcaneus. A non-braided suture was utilized to oppose the muscle to the fascia on the medial aspect of the wound and the skin was closed atop the local muscle flap. The Micro-drain was discontinued on POD#1 and the patient was discharged the following day.

CASE #2



• A 74 year old male with a PMH of DM 2, HTN, CAD, ESRD on HD presented to the ED with lateral left foot ulceration with purulent drainage, malodor, periwound erythema and constitutional symptoms for ~2 days. Consultation was obtained with Infectious Disease and Vascular Surgery who began empiric antibiotic therapy, performed angiography, respectively.

• This patient underwent a staged debridement with fifth ray resection and ultimately supplemental Abductor Digiti Minimi (ADM) muscle flap and closure of the defect. The ADM muscle was identified along the lateral aspect of the wound and mobilized from its fascia and transposed to cover the remaining exposed 4th metatarsal and cuboid. An absorbable non-braided suture was utilized to oppose the muscle to the fascia on the medial aspect of the wound and the skin was closed atop the local muscle flap with supplementation with cartilagenous graft substitute.



Figure 1: Supplementation of the aforementioned lateral foot wound closure with ADM muscle and cartilagenous graft substitute in order to maximize healing potential, provide for prophylactic support of the underlying exposed bone and prevent excessive tension across the partial closure.

CASE #3

• A 69 year old female with a PMH of DM Type 2, HTN, HLD, Kidney and Pancreas transplant presented to the ED with lateral cutaneous abscess which tracked deep to lateral column bone. Consultations were obtained with Infectious Disease, Vascular Surgery and Transplant services who began empiric antibiotic therapy, performed angiography and monitored previous transplant medications and labs, respectively. Diagnostic angiography revealed three vessel runoff past the level of the ankle.



• This patient underwent a staged debridement and supplemental Abductor Digiti Minimi (ADM) muscle flap and closure of the lateral defect. The ADM muscle blood supply was identified with intraoperative Doppler use. Absorbable suture was utilized to transpose the muscle to the fascia on the lateral aspect of the wound and the skin was closed atop the local muscle flap with supplementation with cartilagenous graft substitute within the partial incisional closure.



CONCLUSION

Local muscle flaps should be considered as a reconstructive option for wound closure about the foot and ankle. Pedicled muscle flaps offer a solution to soft tissue defects and are an alternative to free tissue transfers, especially in high risk surgical patients with exposed bone or osteomyelitis in the foot and ankle.

Knowledge of anatomy and surgical technique make the transposition of intrinsic foot muscles like the Abductor Digiti Minimi a practical procedure for the podiatric surgeon. The treatment of exposed bone with intrinsic muscle flaps makes it possible to obtain coverage of exposed structures while potentially reducing hospital length of stay. This is one of many solutions to a common, but challenging problem, and should be regarded as a valuable limb salvage tool.

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