

# Management of Anterior Ankle Wound Dehiscence with Exposed Bone and Hardware Following Tibial Talocalcaneal Arthrodesis with Hemisoleus Muscle Flap

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## Statement of Purpose

The use of hemisoleus muscle flaps for coverage of mid-tibial osteomyelitis with soft tissue defects has been well-established in literature; however, it is infrequently discussed for coverage of distal anterior tibial defects. We present an additional application of the hemisoleus muscle flap for treatment of a distal anterior tibial soft tissue defect with underlying osteomyelitis following tibial talocalcaneal arthrodesis for limb salvage.

## Literature Review

Soft tissue defect coverage with underlying tibial osteomyelitis may be treated with vacuum-assisted closure and serial debridement. If this results in failure to achieve closure, other options to aid soft tissue coverage must be explored. Muscle flaps provide vascularity and bulk coverage to areas of exposed or infected bone, making muscle flaps a very appropriate option in cases of defects that have failed conservative treatment.

Many muscle flaps in the region of the distal tibia are small with a limited arc of rotation and do not provide adequate coverage of larger defects.<sup>1</sup> Medial hemisoleal muscle flaps offer a wider arc of rotation with an independent blood supply directly from the posterior tibial vessel and only partially sacrifice the muscle.<sup>1,2</sup> These muscle flaps have been well-reported in the literature for coverage of defects in the middle third of the leg, with intermittent reports of use in the distal one third for soft tissue defect coverage following fractures.<sup>1,2</sup> Cadaveric studies have suggested that the vascular supply of the distal flap is constant and therefore may be useful for additional distal soft tissue defects.<sup>3</sup>

## Case Study

A 46-year-old male presented with history of a talar fracture and avascular necrosis with subsequent collapse of the posterior subtalar joint and ankle arthritis. A tibial talocalcaneal fusion was performed with crossed screws and a distal femoral locking plate spanning the ankle and subtalar joint. Three months postoperatively, he developed osteomyelitis with exposed hardware at the medial aspect of the ankle. An arterial duplex exam of the lower extremity was performed and it was discovered that the anterior angiosome was compromised at the macro and microvascular level, likely from previous trauma. The patient was placed on long term IV antibiotics for management of infection. The decision was made to perform a hemisoleal muscle flap due to the local vascular issues. At one month postoperatively, the patient developed a hematoma that was evacuated in clinic and central necrosis of the flap was noted at this time. At five months post index procedure he underwent debridement of the hemisoleal muscle flap with exposure of the tibia post-debridement. A bilayer matrix graft and negative pressure wound therapy were applied, and this was continued for 12 months. At this time, partial epithelialization of the muscle flap was noted. At 21 months post index procedure, the wound bed was noted to have an adequate amount of granular tissue and a split thickness skin graft was applied.



Figure 1a



Figure 1b



Figure 1c



Figure 1d



Figure 1e

**Figure 1.** Operative procedure. Pre-operative anterior wound with underlying tibial osteomyelitis (1a), incision with initial exposure (1b), flap dissection (1c), wound coverage (1d), final index procedure closure (1e).

## Surgical Technique

A doppler was used to map the perforating arteries to the medial soleus, marking the most distal perforator at approximately 7cm proximal to the medial malleolus. A medial incision was made from the proximal 1/3 of the tibia distally to the medial malleolus parallel to and 1cm posterior to the long axis of the tibia (Figure 1b). The soleus muscle belly was sharply resected from the proximal attachment on the tibia and transected just lateral to the median raphe of the muscle belly. The muscle was elevated proximally to the level of the most distal perforator. At this level, the muscle was rotated around its arc of rotation to cover the anterior wound, taking care to ensure patency of the distal perforating vessel with use of a doppler (Figure 1c). The muscle belly was placed within the wound bed (Figure 1d) and a bilayer membrane graft was applied (Figure 1e). An external fixator was unnecessary to prevent motion at the ankle to immobilize the flap in this case since a solid ankle arthrodesis was achieved previously. A bolster dressing was applied postoperatively to help prevent hematoma.



Figure 2a



Figure 2b

**Figure 2.** Twenty-one months post-index procedure wound (2a) with split thickness skin graft coverage (2b).

## Discussion

Treatment of distal anterior tibial soft tissue defects with underlying osteomyelitis is challenging to treat and standard wound care treatment options are often ineffective. While reports in literature demonstrate use in distal tibial fractures, there are no reports to our knowledge of its use as presented in this case study.<sup>1</sup> Despite delay in healing in this case, the patient expresses improvement in subjective pain scores and ambulatory tolerance. This study presents a hemisoleus muscle flap as a viable option for treatment of distal anterior tibial soft tissue defect with underlying osteomyelitis following tibial talocalcaneal arthrodesis. This technique allowed for complete wound closure and successful limb salvage.

## References

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