Fasciocutaneous Flap Coverage of a Lower Extremity Forefoot Deficit

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Statement of Purpose

Lower extremity amputations often have a high rate of wound dehiscence requiring revision surgeries or further amputation when performed in patients with multiple medical co-morbidities. This results in a poor soft tissue envelope that is unable to provide adequate soft tissue coverage, requiring a more proximal amputation, a more complex procedure, or a long-term attempt at wound care. This case study evaluates the efficacy of a reverse sural fasciocutaneous rotational flap to provide rapid, long lasting coverage of large forefoot ulcerations in attempted limb salvage cases.

Methods

Patient Characteristics and Treatment	
Gender	Male
Age	79
Comorbidities	Diabetes Mellitus II, ESRD on hemodialysis, Failed kidney transplant, Peripheral vascular disease, Heparin induced thrombocytopenia, Atrial fibrillation
Presenting wound	Dehisced transmetatarsal amputation with exposed medullary canals
Vascular Procedures	Left external iliac angioplasty with intervention, SFA atherectomy, SFA stenting, Endovascular trifurcation
Treatment	Transmetatarsal amputation, Revision lisfranc amputation, Intrinsic muscle flaps, Reverse sural fasciocutanoeous flap, Application of external fixator

Procedures

Under general anesthesia soft tissue and bone were debrided to healthy bleeding tissue margins, at the level of the lisfranc joint. Intrinsic muscles within the amputation site were then isolated and used for rotational flap coverage of the exposed bones to provide a vascularized wound bed. The patient was then made prone and a thigh tourniquet applied. Doppler examination was performed to identify perforators and a reverse sural fasciocutaneous flap was raised with a long skin bridge and large skin paddle. Tourniquet was then released and hemostasis was obtained. Elevated flap was bathed in warmed saline and papaverine prior to final rotation and inset to alleviate transient vasospasm. The donor site was then covered with a regenerative dermal matrix to cover the exposed gastrocnemius muscle. A ring external fixator was then applied to immobilize the operative extremity as well as a large well padded dressing with an open window for continuous flap monitoring



 Figure 1: Pre-debridement
 Figure 2: Post-debridement/lisfranc

 wound dehiscence status post
 amputation with intrinsic muscle flap

 transmetatarsal amputation
 coverage of exposed bone

Results

Successful reverse sural fasciocutaneous flap. Audible doppler examination was performed post-operatively. No evidence of venous stasis or obstruction was encountered. Adequate capillary refill of flap margins without evidence of necrosis.



Figure 4: Inset and application of external fixator

viability evaluation



Figure 5: Nitroglycerin paste to flap margins

sural fasciocutaneous flap

Analysis & Discussion

Wound dehiscence following amputation is an often seen complication, with rates as high as 70%.¹ Providing coverage for exposed avascular structures is often difficult through conservative means and may lead to a more proximal amputation. The reverse sural fasciocutaneous flap provides lasting coverage of large forefoot wounds in limb salvage with rates of total flap failure as low as 3.1%.²

Intrinsic muscle flap coverage of exposed bone provides a vascularized wound bed and lowers

Analysis & Discussion

potential post-operative complications. Rotating the intrinsic muscles of the foot after amputation provides additional soft tissue coverage in the event of wound dehiscence or flap failure, more amenable to local wound care or split thickness skin graft for salvage.

Harvesting the reverse sural flap may be complicated by variation in nerve branching patterns. In our case a type B specimen was seen, with the medial and lateral sural cutaneous branches failing to unite to form the sural nerve.³ This must be identified pre-operatively to ensure incorporation of the sural nerve and the small saphenous vein as well as their accompanying vasa nervorum and vasa vasorum within the flap margins to improve flap viability.⁴

After initial elevation, the pedicle experienced transient vasospasm. It is of critical importance to have alternatives to promote vasodilation given the patients diagnosis of heparin induced thrombocytopenia. Initial vasospasm was alleviated with warmed saline and the use of papaverine.⁵ Nitroglycerin paste was additionally used around the flap periphery post-operatively to continue to promote vasodilation and the patency of the pedicle.

As the flap was rotated across a joint, an external fixator was chosen to prevent motion and shearing of the flap. Failure to do so results in excessive forces on the delicate flap margins and will likely result in complications that can lead to flap failure.

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