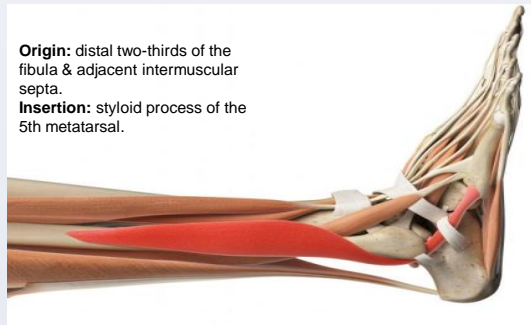


Introduction

Reconstructive options for defects of the distal third of the tibia are often limited, challenging and cited as requiring free tissue transfer. Local options can be used where the zone of injury allows.

Full thickness burns to the anterior tibia quite often result in exposure of the tibia. Not all burn patients are suitable for microsurgical reconstruction for a range of reasons and therefore local options need to be explored.



Origin: distal two-thirds of the fibula & adjacent intermuscular septa.
Insertion: styloid process of the 5th metatarsal.

Fig 1: Peroneus brevis muscle

The Peroneus Brevis (PB) is a thin fusiform muscle in the lateral compartment of the leg which contributes to plantarflexion and eversion of the foot (figure 1). It is deep and anterior to the Peroneus Longus (PL) and is innervated by the peroneal nerve.

The PB receives blood supply from all major leg vessels with an average of 4 perforators. The dominant, proximal pedicle is from the peroneal artery. Presence of an axial vessel running through the length of the muscle and connecting all source arteries suggests this muscle is a **type VI** muscle flap rather than type II or IV. With these perforators it can be transposed on proximal or distal pivot points. Donor site is acceptable and functional deficit minimal if peroneus longus is intact.

AIM: We demonstrate in detail the technique and use of this flap with subsequent successful outcome in a challenging case.

Case report

Our patient sustained 75% TBSA full thickness accelerant-derived flame burns, with necrosis of anterior compartment of the right leg, leaving a ~15cm full thickness (FT) defect over the lateral aspect of the tibia.

The patient was treated with early burn excision. The challenge with reconstruction of the tibial defect was that the local fasciocutaneous flaps and free tissue transfer options were all involved in the FT burns.

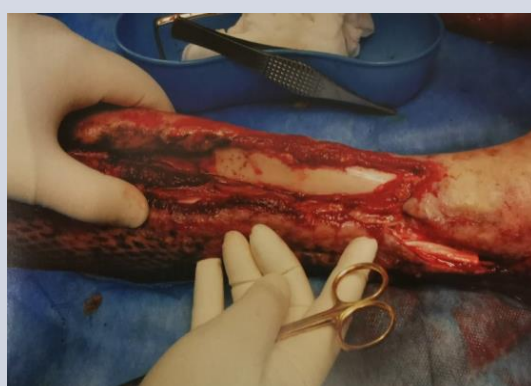


Fig 2: Right leg 15cm x 5cm tibial defect

Reconstructive challenges for this patient's defect:

1. Absence of anterior compartment muscles.
2. Proximal recipient vessels within zone of injury.
3. Heavy bacterial colonization of burns.
4. Need for non-complex reconstructive option for patient recovering from a severe burn injury.

Technique

1. Patient in supine position, with foot in plantarflexion.
 - Optimal position to relax the peroneal compartment.
2. Tourniquet control.
3. Access to compartment via overlying muscle septum.
 - Alternative access gained via skin incision behind & parallel to posterior border of fibula.
4. Superficial Peroneal n. visualised and protected.
5. PB freed distally along tendinous portion.
 - Distal incision over 5th metatarsal may be necessary for more length
 - Tenodesis to PL in order to preserve ankle stability
6. Dissection along sub-periosteal plane from distal to proximal.
7. Branches passing to PL are ligated while preserving the axial vessel running posteriorly within PB.
8. The dominant distal perforator (6-8cm from lateral malleolus) is ligated.
9. Care is taken to preserve the proximal attachment & the dominant proximal perforator.
10. Epimysium is released parallel to the tendon and muscle fanned out to increase surface area for inset.
 - The periosteal portion of the flap must remain on the deep surface of the inset to prevent possible heterotopic ossification



Fig 3: PB identified anterior and deep to PL



Fig 4: Perforator (green arrow) from peroneal artery through the posterior intermuscular septum



Fig 5: PB muscle fanned out & tendon used to secure inset to medial border of defect, donor closed tension-free



Fig 6: Meshed autograft laid over muscle & paratenon

Outcome



Discussion

In our hands this non-microsurgical reconstructive option allowed successful reconstruction of a complex distal tibial defect which healed within 3 weeks with good functional and aesthetic results. Rapid graft take and graft stability seen in our patient suggest robust vascularity throughout the length of the flap when based proximally.

Conclusions

The Peroneus Brevis flap offers a relatively straightforward reconstructive option that can allow rapid healing of exposed bone in the distal third of the tibia without microsurgery. It has:

- low complexity
- relatively short operating time
- minimal donor site morbidity
 - No appreciable loss of contour
- no loss of ankle stability

All these features make it particularly suitable for patients with extensive burns who have contra-indications to free flap reconstruction. This technique would also be suitable in low resource settings where microsurgical facilities are lacking.

REFERENCES

1. Shokrollahi K, Whitaker I, Nahai F. Flaps: practical reconstructive surgery (2017), Peroneus Brevis Flap, 684 - 689