

Statement of Purpose

Large non-healing wounds of the lower 1/3 of the leg present a great challenge with regard to healing. This is especially true in those patients with extensive comorbidities including DM, OM, PVD, and RA. These Peroneus Brevis (PB) muscle flaps show extensive versatility in wound coverage in a variety of lower leg wounds. Muscle flaps can provide increased perfusion, tissue structure, and physiologic healing for those wounds which would otherwise likely result in limb loss.

Case Study

This Case Study revolved around a 62 y/o F with Type 2 Diabetes, Hypertension, and Osteoarthritis. She has failed conservative wound care therapy for the past 24 months. Previous treatment has included allogenic grafting, weekly debridement, and offloading. The decision was made to cover the wound with a PB muscle flap. Vascular studies indicated that the ABI of the RLE was 0.92, with palpable DP and PT pulses. The patient underwent PO antibiotics with multiple wound cultures. The final wound culture before surgery showed no bacterial growth.

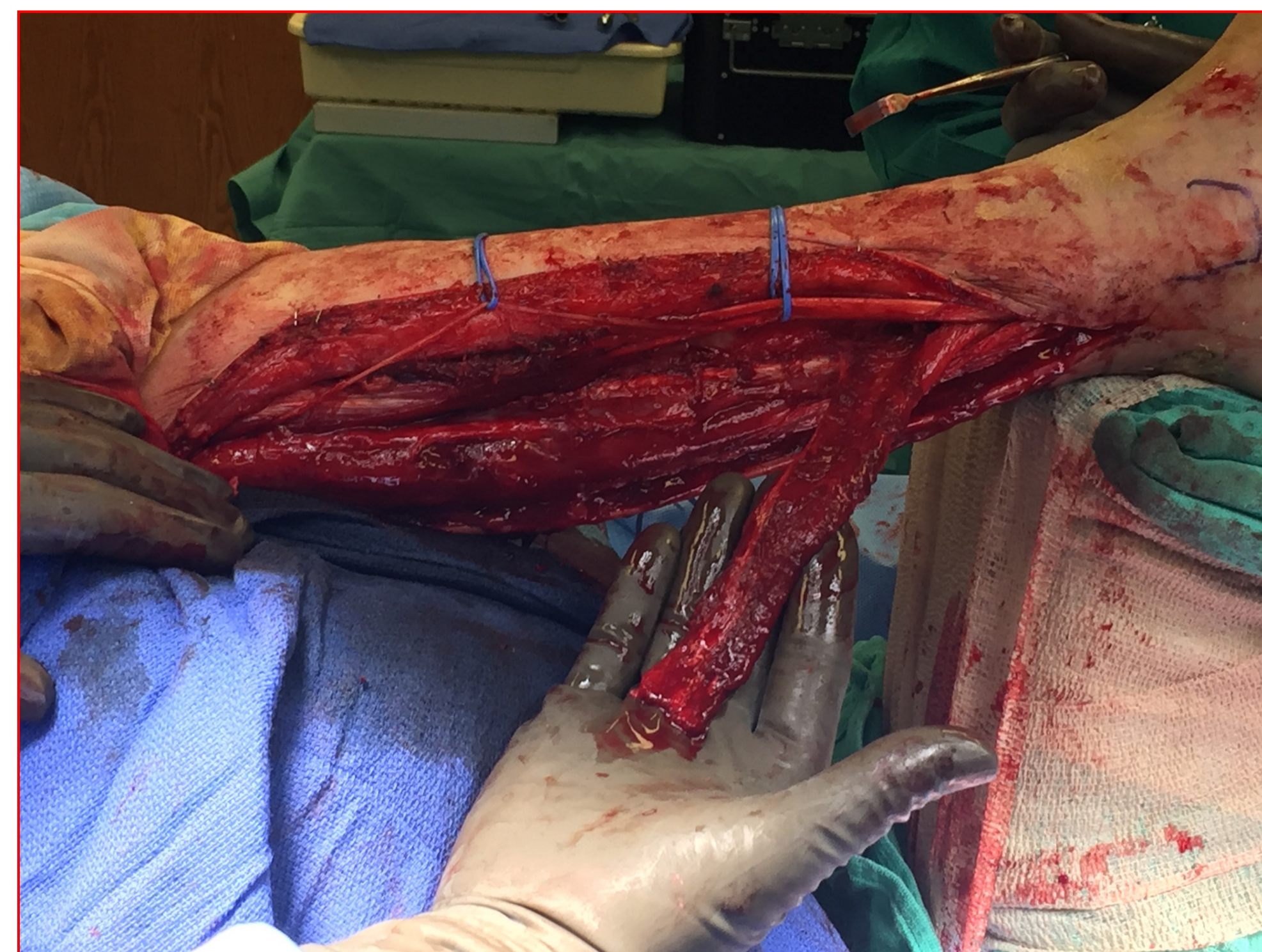


Anatomy of the Peroneus Brevis Flap

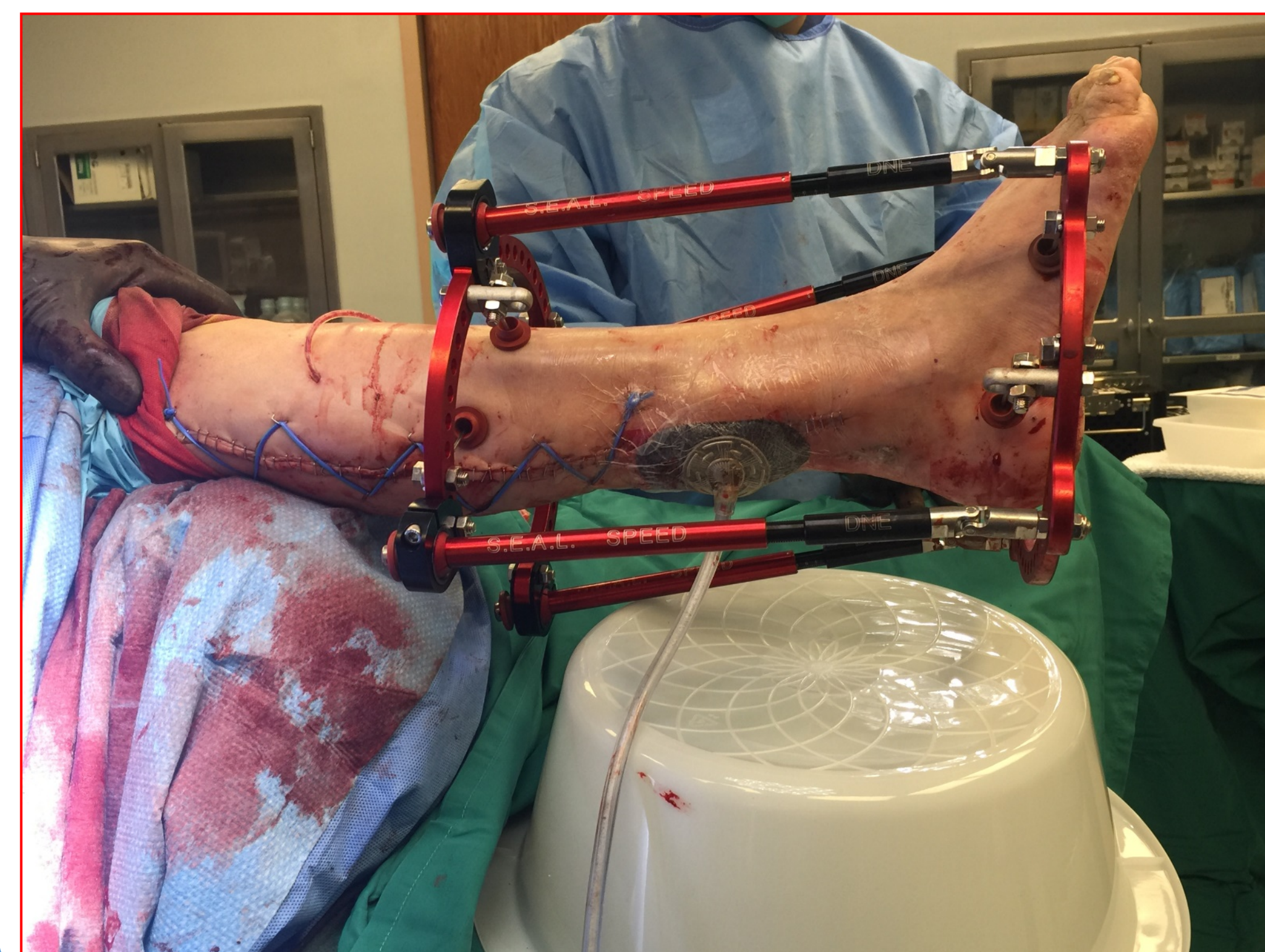
The PB muscle originates from the distal lateral 2/3 of the fibular surface. The distally based flap utilizes the most distal of the 4 perforating arteries to the PB muscle. This vessel is located approximately 5 cm proximal to the lateral malleolar summit. Utilizing a Doppler these vessels are identified and transected leaving only the one of interest. After rotation of the flap, it is important to recheck for flow of the distal perforator as to be sure it is still patent. Due to the flap's location and its inherent arc of rotation, utilizing the distal perforator can allow for a full anterior, lateral, or posterior swing for wound coverage.

Procedure

Due to the chronicity of the wound, its location and size, the PB muscle flap was selected. The PB flap offers excellent blood supply with many perforating arteries and a distal perforator that is the fulcrum of the flap. Starting with a lateral incision, dissection is continued down through soft tissue until the peroneus longus and brevis muscle bellies are identified. The PB is then carefully dissected from its attachments at the lateral fibular surface.



The perforating arteries are identified from proximal to distal, with the distal most artery being preserved. Through the wound, soft tissue is extensively undermined allowing for a tissue tunnel to be created from the posterior wound bed to the lateral compartment. The newly freed PB was then rotated and passed through the tissue tunnel and sutured into the posterior wound base. Next, a bilayer graft was placed over the muscle belly of the flap to help integrate the superficial tissue layers. Negative pressure wound therapy was also incorporated to better help bring all layers together and decrease risk of post-operative hematoma or delamination. Finally, a multiplanar external fixator was placed to immobilize the limb.



Literature Review

Originally, the Peroneus Brevis flap was based proximally as described in 1974 by Mathes and then a distally based version of this flap by Mathes and Nahai was subsequently described in 1997^[1]. Before the early 2000's, the lack of consistency and a systematic approach to performing this procedure may have added to its failure and lack of implementation. With recent advances in microplastic techniques as well as procedural info from authors such as Bullocks, Rodriguez, and Clougherty^[2-4]. The application of this muscle flap for varying lower extremity wounds has become more common place. Each of the referenced articles further supports usage of this flap as well as procedural standards and a systematic approach for success.

Results

At 6.5 weeks Post-Op the external fixator and wound vac were removed and local wound care was initiated. At 8.5 weeks, the bilayer graft had fully integrated and there were no signs of residual graft sloughing. At the 10 and 12 week visits, it continued to show improvement of the graft site with improving peri-wound skin.



At 14 weeks, the picture below depicts the fully healed wound site. There is full incorporation of the bilayer graft with no apparent signs of compromise.



Discussion

The Peroneus Brevis flap as reviewed and supported by the literature is a very useful, versatile and successful flap. The referenced articles below all discuss difficult to heal posterior leg wounds that were recalcitrant to conservative therapy. Both the Clougherty and Bullock articles present cases of wounds that were compromised with underlying osteomyelitis and subsequent Achilles tendon involvement^[2,4]. The Bullock article cited use of the reverse sural flaps for closure of the wounds presented, where as Clougherty presented the use of the PB flap^[2,4]. Each showed significant improvement in the cases presented, with closure of all wounds and resolution of the associated limb deformities. Citing the Rodriguez article, they were presented with a non-healing wound overlying hardware of a previously reconstructed cavo-varus foot^[3]. Local wound care had failed to give closure to the wound, so a PB flap was chosen. In contrast to our presented case, Rodriguez performed a PB flap to cover a chronic anterior wound^[3]. The same principles and post-operative protocol were applied with similar results to our case. Lorenzetti as cited below focused on the residual stability of the flap and ankle after completion. They reported no latent adverse effects of the flap in stability of the lateral ankle. As reported, the majority of the donor site morbidity was associated with the scar formation^[5]. However, they reported no secondary flap failure or further wound dehiscence post operatively. Overall, due to the arc of rotation intrinsic to the peroneus brevis flap, a multitude of ankle wounds can be successfully covered with excellent results and success^[6-7].

Acknowledgements and References

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