



Toe Fillet Flap Wound Closure in a Guillotine Amputation of the 4th Toe in a Complex Diabetic Foot with Vascular Complications

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Purpose

The diabetic foot comes with many potential complications, two of which are foot ulcers and peripheral arterial disease. Concurrently, these complications negatively impact the physiological process of wound healing. Wound closure of the guillotine type amputation for an osteomyelitic toe can be done with the use of an adjacent toe fillet flap. The toe fillet flap or V-plasty closure can be used to achieve primary skin closure, as the guillotine amputation leaves the amputation open to heal by secondary intention, which may result in healing complications. Due to the presence of osteomyelitis in the resected 5th digit phalanges, to properly facilitate wound closure, salvage the lateral skin flap, and maintain optimal biomechanical integrity in of the foot, toe fillet flap closure was utilized.

Literature Review

Küntschner et al. validated the use of a toe fillet flap wound closure by examining 104 fillet flap procedures, specifically, post-op complications and reulceration. The authors came to the conclusion, that fillet flaps facilitate reconstruction in difficult and complex cases. The spare part concept should be integrated into each trauma algorithm to avoid additional donor-site morbidity and facilitate stump-length preservation or limb salvage (3). In another article, Aerden et al. examined primary closure with a filleted hallux flap which was attempted in four out of sixteen patients. No flap necrosis or recurrent infection was noted, and mean healing time was 44 days. Overall complication rate, including wound dehiscence and secondary grafting, was 18%. Major complications such as flap loss, flap revision, or severe infection occurred in only 7.5 % of cases. These complication rates were deemed within the acceptable limit and did not have a significant effect on the overall results of the toe fillet flaps (1). Other articles such as, Alpert et al. have noted the success rate in fillet flap closures of the hand which can correlate to the toe fillet flaps (2). Therefore we have come to the conclusion, that toe fillet flaps should be integrated into wound closure for the foot to avoid re-ulcerations and facilitate limb salvage.

Case Study

A 67-year-old female patient with a history of Type II diabetes and peripheral arterial disease presented with a non-healing infected ulcer to the 4th toe of the left foot. The ulcer was located at the lateral aspect of the 4th digit and had exposed bone present. There was also noted to be a wound at the medial 5th digit of the right foot, likely. Due to concern regarding poor vascular perfusion to the right foot, the patient underwent an arterial duplex study and angiogram with angioplasty to improve blood flow to the right lower extremity prior to surgical correction of the infected 4th toe. X-ray analysis demonstrated osteolysis of the 4th digit and corresponding 5th digit of the right foot. A Guillotine amputation of the 4th toe with toe fillet flap of the 5th digit was performed to achieve primary closure of the 4th toe amputation site.

Pre-Operative, Immediate Post Operative, and 6 Months Post Operative Clinical Images



Fig 1a: Pre-operative clinical image of the foot with noted infection of the 4th digit and the 5th digit on the right foot. Fig 1b: Immediate post-operative clinic image following the guillotine amputation of the 4th toe removal of the 5th toe-nail unit and phalanxes. The lateral skin flap is seen as the closure method. Fig 1c: 6 months post-operative clinic image showing complete healing of the lateral skin flap.

Results

Post operatively deep tissues were sent for of culture and demonstrated Acinetobacter and Pseudomonas, both gram negative bacteria. The patient was put on 10-day course of a Ciprofloxacin. She was instructed to be partial weight-bearing and placed in a controlled ankle movement (CAM) walker boot for four weeks. Sutures were removed at the four-week period after which she was transitioned into a diabetic shoe with multi-density plastazote inserts and is seen monthly for preventive care and check-ups.

Discussion

The lateral skin flap was utilized as the optimal closure method to allow for primary skin closure. The alternative for closure was a more proximal resection of the ray to allow for soft tissue closure. The toe fillet flap allowed for the removal of the three phalanges and nail unit of the 5th toe that was shown to be infected on the x-ray while keeping the lateral aspect of the 5th toe's skin intact for closure of the wound of both the 4th and 5th toes. The toe fillet flap closure allowed us to maintain the biomechanics of the foot while decreasing the chances of reulceration and allowing proper wound closure through primary skin closure.

Pre-Operative and Immediate Post Operative Radiographic Images



Fig 2a: Pre-operative radiographic dorsoplantar view of the right foot
Fig 2b: Immediate post-operative dorsoplantar view radiographic image; Removal of the 4th and 5th digit phalanges and intact metatarsal parabola is shown.

References

1. Aerden D, Vanmierlo B, Denecker N, Brasseur L, Keymeulen B, Van den Brande P. Primary closure with a filleted hallux flap after transmetatarsal amputation of the big toe for osteomyelitis in the diabetic foot: a short series of four cases. *Int J Low Extrem Wounds*. 2012;11:80–4
2. Alpert BS, Buncke HJ. Mutilating multidigital injuries: use of a free microvascular flap from a nonreplantable part. *J Hand Surg Am*. 1978;3:196–8.
3. Küntschner MV, Erdmann D, Homann HH, Steinau HU, Levin SL, Germann G. The concept of fillet flaps: classification, indications, and analysis of their clinical value. *Plast Reconstr Surg*. 2001;108:885–96.
4. Lin CH, Wei FC, Chen HC. Filleted toe flap for chronic forefoot ulcer reconstruction. *Ann Plast Surg*. 2000;44:412–16.
5. Nather A, Wong KL. Distal amputations for the diabetic foot. *Diabet Foot Ankle*. 2013;4:21288, doi: <http://dx.doi.org/10.3402/dfa.v4i0.21288>