Utilization of External Fixation for the Management of Complicated Soft Tissue Wounds Across the Foot and Ankle

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In the absence of wound protection and stabilization, the wound healing process can be fraught with complications, delayed healing, and associated healthcare costs. This concept is especially relevant when managing comorbid patient populations with lower extremity wounds refractory to conservative treatment. Through this case study, we evaluate the utility of external fixation for preventing and stabilizing complicated soft-tissue wounds of the foot and ankle.

Case Study

Consultation was requested for an 83-year-old diabetic male with left distal anterior leg cellulitis with a new wound secondary to a punch biopsy performed twice prior a week on a small chronic leg ulcer to rule out malignancy [Figure 2]. Patient's history was significant for type II diabetes mellitus, chronic lateral leg ulceration, hyperlipidemia, PDV with history of left femoral and popliteal stent four months prior, and partial healing loss resulting in balance issues. Patient was admitted to hospital for increased left leg swelling, redness, and pain. Wound measured 2x3x0.8 cm with thick-tan drainage. DVT was excluded by duplex. Patient was started on Vancomycin and Zosyn with WBC 24.72 on admission. Patient was admitted to ICU for hypotension and SIRS and was medically stabilized. MRI revealed intramuscular abscess and gas formation within entire length of tibialis anterior. Patient received additional debridement of tibialis anterior muscle and tendon the next day [Figure 3], and deep cultures were taken for IV antibiotic guidance and management. Limb salvage and amputation options were discussed with the patient and his family.

This decision was made to salvage the patient's leg, so he could remain functional while living at home independently. Three days after initial debridement, vascular surgery performed an angiogram and percutaneous atherectomy to optimize arterial leg perfusion. Six days after initial debridement, patient received further debridement and skin substitute graft application secured with negative pressure wound therapy (NPWT) [Figure 4]. An ankle-spanning circular ring fixator was applied to manage pain and control motion across ankle joint [Figure 5], which facilitated partial weight bearing for rehabilitation and activities of daily living.

Patient was discharged to a skilled nursing facility for IV antibiotics, NPWT wound management, and physical therapy. At 6 weeks an autologous split-thickness skin graft was applied to the patient's left foot, ankle, and lower leg. External fixator was removed at 8 1/2 weeks, and posterior split was applied. Over the next 4 weeks, remaining wounds healed with local wound care and patient was fitted for AFO before returning home. Sixteen months following initial consult, the patient remained well healed and fully ambulatory [Figure 6].

Soft Tissue Reconstruction Ladder

- Free Tissue Transfers Flaps
- Local Tissue Transfers Flaps
- Tissue Expansion
- Skin Grafts
- Delayed Primary Closure
- Primary Intention
- Secondary Intention

Case Study Cont.

Although our current understanding of foot and ankle wound care and soft-tissue reconstruction has become more advanced through clinical and research efforts, wound management remains a challenging task for healthcare providers and their patients. With appropriate patient selection and close supervision, external fixation can be an effective instrument for offloading and observing complicated lower extremity wounds in comorbid patient populations.

Based on current lower extremity literature, external fixation is well documented for offloading flap applications11,15 and diabetic ulcers15,21,25. However, limited lower extremity studies demonstrate the use of external fixation solely for skin graft application26, especially when located over an active ankle joint22. In our case study, the patient’s wound site remained fully healed and functional 16 months following initial consult using external fixation and guidelines outlined in the soft-tissue reconstruction ladder. When viewed in the context of current literature, this case helps to affirm the advantages of external fixation for managing complicated soft-tissue wounds of the lower extremity. Furthermore, we provide additional evidence for utilizing external fixation to facilitate skin graft application in comorbid patient populations refractory to conservative treatment24.

References


Analysis & Discussion

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