

Introduction

Open tibial fractures often lead to amputation, which affects patients physiologically and psychologically¹ and increases the one-year mortality rate by 47.9%.² Ovine forestomach matrix (OFM) has been used to achieve adequate granulation to support skin grafting in cases of limb salvage with favorable outcomes. This case investigates the efficacy and role of OFM in a complex limb salvage procedure following a severe open tibial fracture.

Methods

- Following initial external fixation and staged tibial open reduction with internal fixation by Orthopaedics, Plastic Surgery was consulted for soft tissue coverage of the open fracture.
- Two days after Orthopaedic intervention, distal left lower extremity pulses were non-palpable. Duplex ultrasonography was performed, revealing severely diminished arterial velocities and total occlusion of the superficial femoral artery. Interventional cardiology was consulted and common femoral artery atherectomy was performed, greatly improving arterial inflow.
- A partially adipose-replaced medial gastrocnemius flap was rotated over the fracture and exposed tibial hardware. Limited muscle flap size prevented a portion of the tibia from being covered.
- After complex partial wound closure, a central portion of the flap and periosteum-covered tibia remained exposed due to skin shortage. Morselized OFM was placed over the uncovered central wound and tibia to encourage rapid granulation. Negative pressure wound therapy (NPWT) was utilized to encourage healing.

Case Presentation

A 72-year-old female with severe peripheral artery disease and atrial fibrillation presented with a left proximal tibial fracture, large overlying laceration, and exposed bone after a fall. The patient was wheelchair-bound, as she was recovering from previous left tibia and pelvic fractures sustained two months prior, and she slipped and fell while transferring from her wheelchair to the bedside commode. On admission, physical exam was notable for a 9 cm x 3 cm open transverse wound over the proximal lower left leg (Figure 1) with surrounding edema and erythema. Distal pulses were 2+ in all extremities with brisk capillary refill.



Figure 1: Initial L Proximal Tibial Injury with Large Overlying Laceration



Figure 2: Left Upper Extremity Graft Donor Site

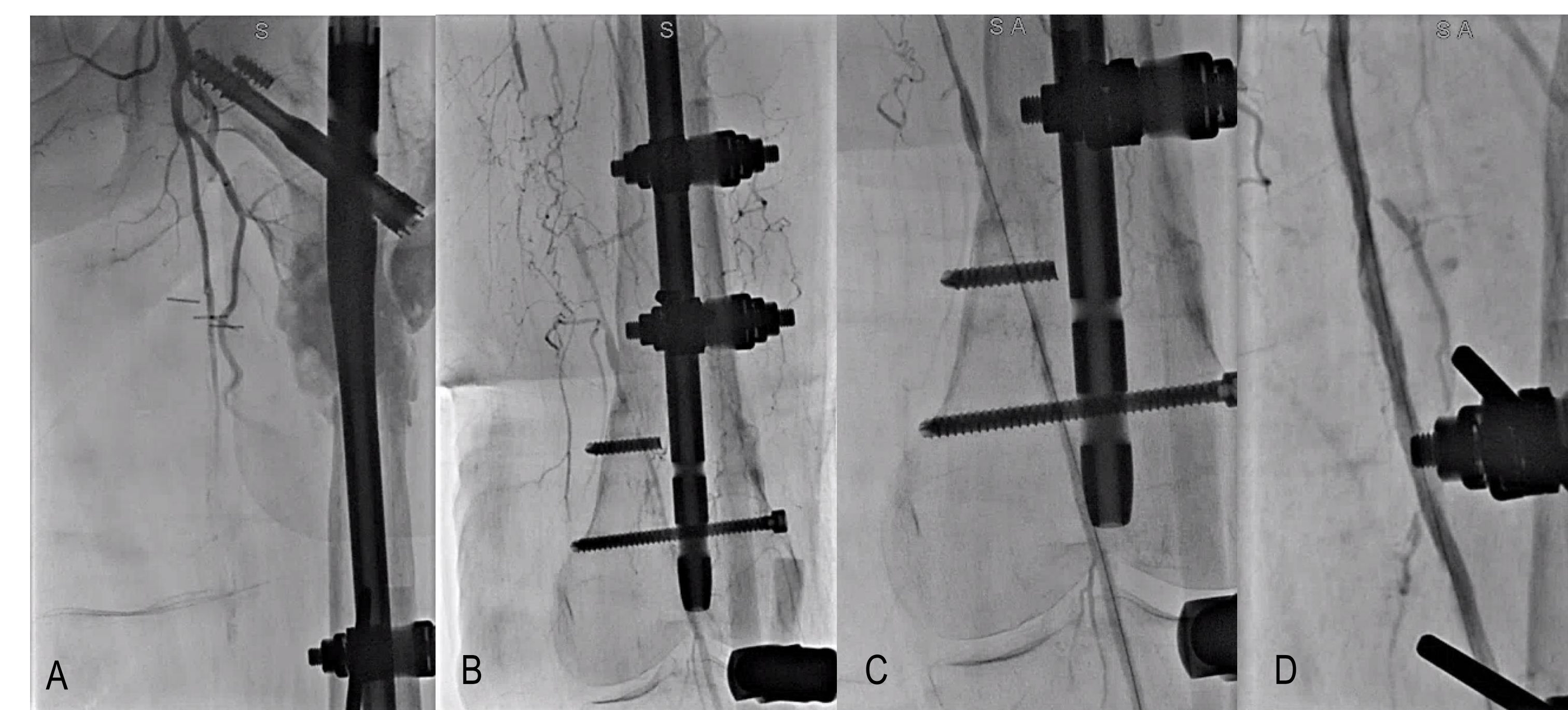


Figure 3: Angiography demonstrating total occlusion of left superior femoral artery (SFA) (A and B); Comparison of angiography showing restoration of blood flow after placement of 150 mm stent in SFA (C and D)



Figure 4a: After Skin Graft Placement and Utilization of OFM



Figure 4b: After Skin Graft Placement and Utilization of OFM

Results

Four days post-surgery, the patient returned to the operating room for skin grafting. The gastrocnemius flap remained viable and intact, and the OFM had achieved adequate granulation to support split-thickness skin grafting. NPWT was applied. The patient was transferred to a long-term acute care hospital (LTACH) for ongoing NPWT and wound management and had full take of the graft and flap. Minor superficial wound dehiscence occurred but is healing well with conservative care. The patient is now ambulating well without assistance.

Conclusion

This case emphasizes the important role of multidisciplinary care in complex limb salvage procedures, allowing for the favorable outcome in this patient. Without a comprehensive, coordinated team including Orthopaedic and Plastic Surgery, interventional cardiology, and LTACH practitioners, this patient likely would have undergone above-knee amputation. Further, avoiding free tissue transfer reduced procedure complexity and anesthetic risk. This case demonstrates OFM's efficacy in limb salvage for complicated open fractures while highlighting the importance of readily accessible, multidisciplinary care in such injuries.

References

- Horgan, O., & MacLachlan, M. (2004). Psychosocial adjustment to lower-limb amputation: A review. *Disability and Rehabilitation*, 26(14–15), 837–850. <https://doi.org/10.1080/09638280410001708869>.
- Stern, J. R., Wong, C. K., Yerovinkina, M., Spindler, S. J., See, A. S., Panjaki, S., Loven, S. L., D'Andrea, R. F., Jr, & Nowygrod, R. (2017). A Meta-analysis of Long-term Mortality and Associated Risk Factors following Lower Extremity Amputation. *Annals of Vascular Surgery*, 42, 322–327. <https://doi.org/10.1016/j.avsg.2016.12.015>.