Primary Retrograde Tibiotalocalcaneal Nailing in Geriatric Patients with Complex Hindfoot and Ankle Injuries

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Purpose

The incidence of fragility fractures in the elderly population continues to increase.[1] These patients frequently present compromised soft tissue envelopes that can make traditional open reduction internal fixation methods precarious in addition to dealing with osteoporotic bone.[2] The purpose of this cases series is to show how retrograde tibiotalocalcaneal nailing for management of complex ankle trauma in this population is an effective way for early weightbearing and return to function with fewer complications.

Case Studies

One case is a 93 year old female who presented with an open trimalleolar ankle fracture from a mechanical fall who developed extensive skin necrosis to the laceration site after developing a hematoma to the open fracture site that was surgically evacuated (Fig. 1). The second case is a 76 year old diabetic female who sustained a closed tibial plafond with a medial malleolus fracture and a significantly comminuted talus fracture following a auto-pedestrian accident who had severe bone loss (Fig. 2).

Figure 1: (A)-(B): Initial clinical images. **(C):** Initial Mortise View **(D):** Clinical Image of open fracture skin necrosis after hematoma evacuation.

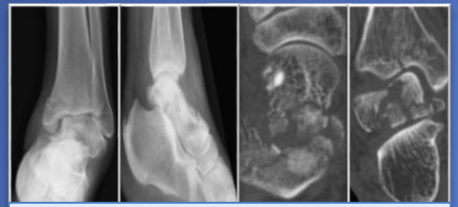

Figure 2: (A)-(B): AP and Lateral Views. **(C)-(D):** CAT scan showing significant comminuted talus fracture and tibial plafond injury

Figure 3: (A): Intra-operative view of talus and tibial plafond fractures. with anterior incision. **(B)-(C):** Immediate post operative AP and Lateral views

Figure 4: (A)-(B): Immediate post operative AP and Lateral Views. **(C):** Post operative Day 2 Dressing Change. **(D):** 7 Months post surgery.

Procedure

Two patients were treated with primary retrograde tibiotalocalcaneal (TTC) nailing after sustaining a traumatic injury once they were stabilized. In both cases, prior to placement of the retrograde nail, a delta external fixator frame was applied the day of injury to stabilize the ankle joint and to allow for the soft tissue envelope to calm down. Computerized axial tomography (CAT) scans were obtained for final surgical planning. During the final procedures, the ankle joint was prepared through an anterior incision for the patient who had sustained the comminuted talus fracture and tibial plafond injury with medial malleolus fracture (Fig. 3), but was not traditionally prepared for the other patient. In both patients it was deemed the subtalar joints did not have to be prepped. The nail was inserted by standard manufacturer technique. The delta external frames were removed. The open fracture patient did require extensive excisional debridement of wound bed to bleeding granular tissue and application of a Integra bilayer wound matrix (Fig. 4) and the fibula and medial malleolus fractures were percutaneously fixed. Post operatively, patients were kept non-weightbearing until the plantar incision at the nail insertion site was healed; at this time they were transitioned to weight bearing as tolerated in a CAM boot.

Figure 5: Radiographic Tibiotalocalcaneal fusions achieved with latest images. **(A)-(B)** Open Trimalleolar Fracture patient 7 months and **(C)-(D):** Talus fracture and medial malleolus with tibial plafond patient 5 months post surgery.

Results

Both patients progressed to full weight-bearing as tolerated in a CAM boot after plantar sutures were removed approximately 3 weeks post-operatively. The patient that had sustained the open fracture did need local wound care, but healed following a single integra application (Fig. 4D).
Both patients displayed radiographic union on X-rays (Fig. 6). Thus far, both patients do not have subtalar joint pain or hindfoot instability. There were no wound infections or hardware failures.

Discussion

Elderly patients who remain immobilized and bedbound after suffering traumatic injuries are at high risk of developing pressure ulcers, pneumonia, and deep venous thrombosis. [(3)]
The use of TTC nailing in this population is an effective treatment option to limit such complications and allows patients to be mobilized earlier. [(1-2)] It is not necessary to prep the subtalar joint and both patients in this instance were sensate. The subtalar joint had osseous union and this helps cut down on surgery time and elderly patients decreases the time they are under general anesthesia. [(4)] In conclusion, we have seen favorable outcomes thus far with this surgical approach and would propose initiating a multi-center study to compile more case data.

References

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