

## Introduction and Purpose

Diabetic patients who suffer ankle fractures are at higher risk for complications such as wounds, infection, Charcot neuroarthropathy, and amputation. There has been a debate in the literature as to whether surgical or conservative measures are more appropriate when treating diabetic ankle fractures. Furthering that discussion is the option of ORIF vs. external fixation. Ultimately reducing and stabilizing the fracture while also preserving the soft tissue envelope are vital to avoiding complications. This case described the comparison of staged ORIF and external fixation vs. primary external fixation for bilateral trimalleolar ankle fractures in an uncontrolled diabetic patient.

## Methods & Procedure

A 43 year old obese, poorly controlled diabetic female presented to the ED with right trimalleolar ankle fracture after reporting suffering from a “dizzy spell”. Upon evaluation of the right ankle, a supination-external rotation stage IV fracture pattern was noted on x-ray with complete disruption of the tibiotalar joint and posterior dislocation of the talus (Figure 1). Patient underwent a successful close reduction of the deformity in the ED, was placed in a posterior splint and subsequently admitted for surgical intervention with Medicine and Vascular services consulted for clearance.

The patient underwent an ORIF procedure with an interfragmentary screw placed through the fibular fracture along with a neutralization plate (Figure 2). The medial malleolus was fixated percutaneously and the patient was placed in a non-weightbearing below-the-knee cast. After two weeks the patient presented with wound dehiscence and lateral plate exposure. Surgical debridement was



Figure 1

performed and the patient underwent 6 weeks of IV antibiotics with instruction to continue non-weightbearing. The patient subsequently returned to the ED with a recurrent deformity after walking on the affected extremity. Re-fracture and dislocation of the tibiotalar joint was noted (Figure 3). She was again cleared for surgery and returned to the OR for application of a Stryker circular external frame and tendo-Achilles lengthening after successful reduction of the fracture (Figure 4). After 16 weeks consolidation was noted on x-ray and the frame was removed (Figure 5). Bone biopsies were performed of the fibula which were negative for osteomyelitis. Patient was then treated further with additional below-the-knee casts, bone stimulator and a CROW boot.

## Methods & Procedure (continued)

The same patient who was 46 years old at the time returned to the ED for evaluation of a now left tri-malleolar ankle fracture after falling in her apartment. Initial evaluation for the left ankle x-ray revealed complete dislocation of the talo-crual joint with a Weber-B type fracture of the fibula showing complete displacement and shortening as well as a transverse, displaced fracture of the medial malleolus (Figure 6). Lateral x-ray revealed complete dislocation with posterior migration of the talus along with posterior and superior displacement of the fibula fragment. Closed reduction was attempted in the office followed by application of a short leg cast. Patient was subsequently directly admitted for surgical work-up including Infectious Disease, Vascular and Medicine consults. She then underwent a procedure for application of a percutaneous fibular nail followed by a Stryker circular external frame and tendo-Achilles lengthening resulting in successful reduction of the fracture. (Figure 7)



Figure 2



Figure 3



Figure 4



Figure 5

## Results

For the right ankle, bone consolidation was noted at 16 weeks radiographically and frame was removed. Patient underwent additional bone biopsies demonstrating no presence of osteomyelitis. She remained non-weight bearing in a below-knee-cast with a bone stimulator. Complete fracture consolidation was noted nearly a year after original injury occurred and the patient is now weight-bearing as tolerated in a CROW boot. In comparison, the left ankle showed bone callous formation at 7 weeks post op with the ankle held in neutral position. The frame itself removed at 6 weeks post op (Figure 8). Patient underwent casting for an additional 8 weeks and then transitioned to an ASO brace and a Crow walker. A full thickness ulcer developed 8 weeks post-op on left anterior ankle from a prior fracture blister. The wound underwent serial debridement and collagen dressing changes until it resolved 6 weeks later.



Figure 6

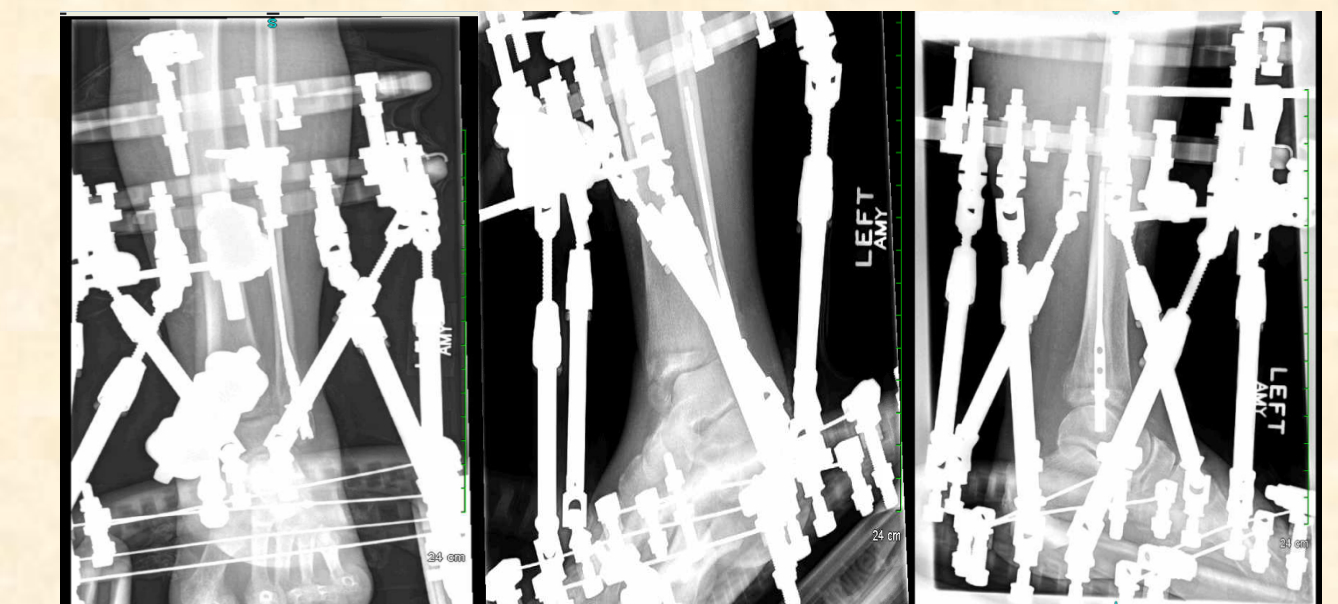


Figure 7



Figure 8

## Analysis and Discussion

As the data is mixed in terms of operative versus nonoperative treatment for diabetic ankles, complication rates as high as 71% have been reported in both groups regardless of treatment option. If surgical intervention is warranted, this case study in particular demonstrates the advantages single stage external fixation may have versus traditional open reduction internal fixation for treatment of a trimalleolar ankle fracture in the uncontrolled diabetic. We believe the case presented here is unique in reinforcing this concept given the opportunity to see variable outcomes within the same patient. It has been well established that patients with uncontrolled diabetes and existing comorbidities are at increased risk for complication. A recent review of the Department of Veterans Affairs database examined over 20,000 diabetic patients undergoing elective surgery. It was found that for each 1% increase in hemoglobin A1c, the odds of developing a post-operative complication increased by 5%. Liu et al looked at the pre-operative HbA1c of 21 diabetics prior to undergoing ankle ORIF. Higher HbA1c levels were associated with delayed and non-union and poor radiological outcomes. This suggests that HbA1c may be predictive of complication rates. Taking that into consideration, it may be reasonable to delay or stage operative treatment in the unstable diabetic patient.

## References

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