Ankle fragility fractures treated with primary retrograde tibiotalocalcaneal nail: early clinical and radiographic outcomes

Introduction:
Ankle fragility fractures are very difficult to treat due to poor bone stock and soft tissues, and the likelihood of comorbidities such as diabetes mellitus (DM) and peripheral neuropathy. Conventional open reduction internal fixation in this population has been shown to lead to significant complications. The goal of this study is to show that primary fixation of ankle fragility fractures with a TTC nail is a safe surgical option that not only leads to satisfactory fracture alignment and union, but decreases the overall perioperative complication rate in this high risk cohort.

Methods:
We retrospectively evaluated 8 patients treated with primary retrograde tibiotalocalcaneal nail without joint preparation for ankle/pilon fragility fractures. Full hospital, clinical and radiographic review was performed, focusing on comorbidities and complications.

Results:
All 8 patients had DM, and 6 had sensory neuropathy. Average follow-up was 447 days. Operating room time was 70.1 minutes. Average blood loss was 26.3mL. There were no superficial infections and one deep infection in a patient who sustained an open fracture. This patient required removal of the nail and replacement with an antibiotic-coated nail. At final follow-up, this patient was not weightbearing and had not gone on to union. The other seven patients went on to union at an average of 18 weeks with adequate alignment. Four patients returned to pre-operative ambulatory status. There was one case of implant failure which involved a nail fracture at just beyond one year follow up.

Discussion:
Our study shows retrograde TTC nail can be a very useful treatment option in this difficult population. Operative time and blood loss are decreased when compared to historical ORIF, soft-tissue dissection is kept to a minimum and patients are allowed to mobilize and weight-bear earlier. We were able to show that primary TTC nail is very successful in fragility ankle fractures, especially in the setting of DM and peripheral neuropathy. There was only one significant complication in this group, and it was in the setting of an open fracture. Return to pre-operative function was not optimal, but the majority of patients went on to solid union with minimal complications.

There are some limitations with this study. First, it is a non-randomized retrospective cohort study without a control group. The study is also small in size, which may make it difficult to draw meaningful conclusions from the data. However, this is partly due to the fact that this is a newer treatment that is not currently in widespread use. We did have reasonable follow-up length, which helped bear out longer-term results and late complications that may be seen with the treatment.
In conclusion, we believe retrograde TTC nail is an acceptable treatment in ankle fragility fractures as it can give solid bony stabilization to allow early weight-bearing and mobilization without significant soft-tissue complication, especially in the setting of significant comorbidities. Large, prospective, randomized trials comparing this treatment to standard ORIF would be beneficial to further evaluate its efficacy.