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## The CORE Foot and Ankle Advanced Reconstruction Fellowship

### Statement of Purpose

Depending on the extent of talar avascular necrosis (AVN), total ankle arthroplasty may be contraindicated. A novel treatment option for partial talar AVN is revascularization through ankle fusion followed by takedown with conversion to total ankle replacement (TAR). The purpose of this poster is to present a case and demonstrate its potential viability as a treatment option.

### Literature Review

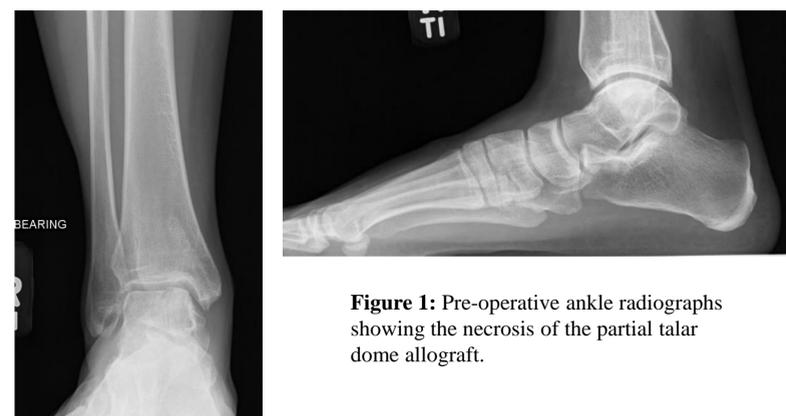
AVN of the talus with ankle arthritis is a difficult pathology to treat. TAR may be possible with very limited AVN (where the surface of AVN will be excised with bone cuts), but more extensive talar AVN is a contraindication for TAR. Ankle arthrodesis is currently the recommended treatment option for treating end-stage ankle arthritis with collapse of the talar dome<sup>1</sup>. Ankle arthrodesis is a reliable treatment option with the majority of patients having favorable results, however, a considerable number still experience fair to poor results<sup>2</sup>. When continued hindfoot pain persists postoperatively following a well aligned and successfully fused primary ankle arthrodesis, little can be done to alleviate this pain.

A potential benefit of TAR, although unproven, is that it helps contain arthritis to the ankle joint. Numerous publications which show a significant pain score and AOFAS score improvement with conversion of ankle fusion to TAR<sup>3-6</sup>. Patients tend to do best with conversion of ankle fusion to TAR when the fibula has been preserved, neutral hindfoot alignment is achieved, and the cause of pain can be deciphered, and the patient has had less than four previous procedures on the ankle<sup>4,5</sup>. Concomitant procedures are frequently needed, most commonly a tendoachilles lengthening is necessary. Fusion of adjacent arthritic joints can be performed at time of takedown, but pain at these sites may subside with motion now available from the ankle. Intraoperatively, it is recommended to prophylactically fixate the medial malleolus<sup>3,5</sup>. Postoperatively minor total ankle component settling is common<sup>3</sup>.

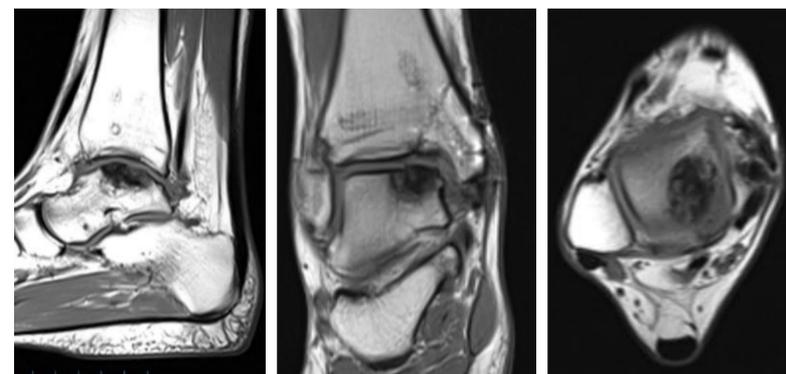
Only two studies have described talar revascularization prior to TAR<sup>1,7</sup>. In the study by Lee<sup>7</sup> two cases were reported where MRI and bone scan studies were simply used to monitor the talar AVN until revascularization was achieved<sup>7</sup>. Following revascularization, a cementless mobile bearing TAR was performed, with the authors claiming the specific implant reduced the risk of talar AVN collapse<sup>7</sup>. The lone paper discussing revascularization of the talus by hindfoot fusion was authored by Devalia and colleagues<sup>1</sup>. They showed 7 cases of end stage ankle arthritis treated in a two staged approach with subtalar joint fusion followed by TAR<sup>1</sup>. All 7 patients were at least satisfied with their results after a minimum of 3 years, and functional outcomes also significantly improved<sup>1</sup>. We present the first case of revascularization of the talus through ankle fusion, which was followed by successful takedown of ankle fusion with conversion to TAR.

### Case Study

A 34 year old female presented in 2015 with chronic right ankle pain. She had prior history of a talus microfracture 5 years prior due to an osteochondral defect in her talus. Patient failed talar microfracture and received a talus allograft 3 years prior to presentation, followed by hardware removal 1 year later. There was no associated vascular or neurologic pathology or history, and patient had significant pain on ROM testing. At this point an MRI was performed showing roughly 50% healing of the talus allograft. As an initial treatment option an ankle arthroscopy with debridement of talus allograft and curettage of the medial malleolar screw holes with autograft used for backfilling was performed.



**Figure 1:** Pre-operative ankle radiographs showing the necrosis of the partial talar dome allograft.



**Figure 2:** Pre-operative ankle MRI showing continued tibiotalar chondromalacia and necrosis of the partial talar dome allograft.

### Case Study

Patient continued having right ankle pain, and 3 months after ankle arthroscopy repeat radiographs and an ankle MRI were performed showing continue chondromalacia of the tibiotalar joint (Figures 1 & 2). Due to continued AVN of the talus allograft, an ankle arthrodesis was recommended with a potential future takedown conversion to TAR if the patient were to have complications or develop secondary osteoarthritis (Figure 3). Approximately 1 year after initial presentation, an ankle fusion was performed with autograft and allograft supplementation to the arthrodesis site (Figure 3). Patient progressed to solid osseous fusion confirmed on CT scan, as well as incorporation and revascularization of the talar body. Patient was transitioned into an ASO ankle brace and returned to full activity.

Rearfoot pain quickly developed post operatively with emphasis over the subtalar and talonavicular joints. Clinical and radiographic exam of the patient's right talonavicular and subtalar joint showed early signs of adjacent joint arthritis. Right ankle fusion takedown to total ankle arthroplasty was performed 1 year after the ankle arthrodesis (Figure 3). Patient progressed from her walking boot at 6 weeks post-operatively to an ASO brace, and received physical therapy and home range of motion exercises. Pain has significantly reduced in the hindfoot and patient is back to normal activity.



**Figure 3:** Post-operative ankle radiographs (top left) following ankle arthrodesis with autograft and allograft supplementation. Post-operative ankle radiographs (top right and bottom left) following conversion of ankle arthrodesis to total ankle replacement due to painful adjacent joint arthritis, and following revascularization of the talus.

### Analysis & Discussion

We report a successful conversion from an ankle arthrodesis to TAR for a young adult with talar allograft AVN, alleviating symptomatic adjacent joint arthritis. The only other report of a staged procedure to revascularize the talus prior to TAR comes from Devalia and colleagues<sup>1</sup>. They also reported successful outcomes in their 7 patient case series, but did result in 2/7 patients experiencing some talar subsidence that did not require revision after 3 years post-operation<sup>1</sup>. Ankle fusion for revascularization of the talus was the only option in this case. Inherently, there are some advantages in performing the ankle arthrodesis. The subtalar joint is spared and the primary pathology of end stage ankle arthritis is addressed. The patient may be able to tolerate and live with the ankle arthrodesis for some time before requiring a conversion to TAR.

There is progressive support for conversion of ankle fusion to TAR if the patient develops adjacent joint arthritis, malunion, or nonunion<sup>3,6</sup>. Our case also supports this concept, as the patient had developed painful adjacent joint arthritis within 1 year of ankle fusion. The conversion to TAR does run the risk of talar subsidence after history of talar AVN, as shown in the Devalia<sup>1</sup> study. This risk was minimized after talar revascularization by the ankle fusion, confirmed with CT and radiographic post-operative evaluation.

This is an isolated case report with 21 months of follow up from initial presentation, and further follow up is needed. Another shortcoming is that this is a case study, and a comparative case series would be more valuable comparing this technique to a staged subtalar fusion prior to TAR. If the talar dome has AVN, revascularization may be successful with ankle fusion. Conversion to TAR may be possible when symptomatic adjacent arthritis develops.

### References

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