# Total Ankle Replacement in Talar Avascular Necrosis: Do All Patients Need a Total Talus Replacement?

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INTRODUCTION: Avascular necrosis (AVN) of the talus poses a significant clinical challenge with poor treatment outcomes due to limited treatment options and high rates of complications. When accompanied by end-stage ankle arthritis, this challenge is exacerbated. The development of implant designs and improved surgical techniques for total ankle replacement (TAR) has made TAR a viable treatment option for end-stage ankle arthritis, but AVN of the talus remains a relative contraindication. There are limited reports in the literature describing outcomes of TAR for talar AVN. Recently, custom-printed total talus replacements (TTR) have been combined with TAR to manage these cases, but this option confers a risk of challenging complications and limited salvage options. This study aimed to describe clinical outcomes of TAR in patients with talar AVN.

METHODS: This is a single-institution series of patients obtained from a prospectively collected registry of TAR patients. Patients who were diagnosed with talar AVN on preoperative MRI and underwent TAR (2016-2023) with any implant (Infinity, Cadence, Vantage, Inbone, Infinity Adaptis; or TTR) were included. Demographics, etiology of AVN, implant type, complications, and reoperations and revisions were recorded. Avascular necrosis subtypes were categorized based on MRI findings: talar dome only, talar dome with extension to subtalar joint, talar dome and body, and 100% talar body. TAR talar implant types were categorized based on extent of talar fixation: rounded/chamfered, flat-cut, or TTR. Fisher's exact test compared revisions and reoperations between patients who underwent TAR with TTR and patients who underwent TAR with flat-cut or rounded/chamfered talar implants.

RESULTS: 20 patients were included (mean age 56.4 [range: 27-78] years, mean BMI 29.7 kg/m2, 12 (60.0%) females) with mean 37.8 months since index TAR. Talar AVN etiology was post-traumatic (n=12, 60%), secondary to steroid use (n=5, 25%), or idiopathic (n=3, 15%). Six patients (30%) underwent TAR with TTR, including 2/13 patients with AVN of talar dome only, 1/3 with AVN of talar dome extending into subtalar joint, 1/2 patients with AVN of talar body; and 2/2 with AVN of 100% talar body. 12 (60%) patients underwent TAR with flat-cut talar implant, and 2 (10.0%) underwent TAR with rounded/chamfered talar implant. There were no revisions and no significant differences in reoperations between TAR+TTR and TAR patients, although 1 flat-cut patient did have talar loosening treated nonoperatively.

DISCUSSION AND CONCLUSION: This study demonstrates that TAR, with or without TTR, can be a viable treatment option for patients with talar AVN and end-stage ankle arthritis. Although TTR may be necessary for patients with AVN of 100% of the talar body, patients with AVN of the talar dome can successfully undergo TAR without TTR and experience low rates of revision and reoperation at early followup. This is important given the complication risks of TTR including instability, infection, adjacent joint arthritis, and limited salvage options for failed TTR. Appropriate classification of AVN may guide appropriate implant selection for these challenging cases.

**Figure.** Categorization of talar avascular necrosis. Avascular necrosis subtypes were categorized based on MRI findings: A) talar dome only, B) talar dome with extension to subtalar joint, C) talar dome and body, and D) 100% talar body.