Revision INBONE Total Ankle Replacement

James K. DeOrio, MD

KEYWORDS

• INBONE • Total ankle replacement • Total ankle arthroplasty • Revision
• Ankle arthritis

KEY POINTS

- The INBONE total ankle replacement is an excellent primary and revision ankle replacement because of its modularity and the ability to make up any tibial bone loss.
- Revision of the INBONE total ankle replacement may be necessary, however, because of poor patient selection, technique error, or infection.
- If it is because of poor patient selection, then other specialty consultations (eg, plastic surgery for free tissue transfer) may be needed to provide patients the best care possible.
- If the ankle needs to be reoperated on because of a technical error, then often that additional surgery can be performed in a second stage.
- Finally, if the ankle needs to be removed (eg, infection), doing so posteriorly and filling the defect with a femoral head and securing it with a retrograde compression locked intramedullary nail can give patients a very functional limb.

INTRODUCTION

Although there are specific components designed for revision hip, knee, and even shoulder replacement, in the United States, no such prosthesis exists for ankle replacement, although custom talar prostheses have been used.[1] Instead, when appropriate, surgeons must rely on primary prostheses and surgical technique to salvage total ankle replacements that have failed. Fortunately, the failure rate is generally low, 5% to 15% at 8 to 12 years.[2] Other studies[3] cite a higher failure rate, increasing the importance of articles like this one. When using off-the-shelf bulk prostheses for revisions, one surgeon reported results as "good" in 83% of revisions accomplished.[4] In my opinion, the INBONE (Wright Medical Technology, Arlington, Tennessee) ankle offers a good primary and revision/replacement ankle. What should be done, however, when the INBONE total ankle replacement fails? This article discusses the reasons for

Dr DeOrio is a consultant for the manufacturer of the INBONE ankle, Wright Medical Technology (Arlington, Tennessee).
Department of Orthopaedic Surgery, Duke University Medical Center, Duke Medical Plaza, 4709 Creekstone Drive Suite 200, Durham, NC 27703, USA
E-mail address: James.deorio@duke.edu

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failure of primary and revision INBONE total ankle replacements and how to reconstruct the ankle.

The INBONE total ankle replacement is unique. With the new INBONE II design, the talar component has a V-shaped platform with a matching ultrahigh molecular weight polyethylene (UHMWPE) design firmly attached to the tibial component. A more detailed insertion technique is included in an article by DeOrio.[5] Previously, the INBONE talar component was a saddle-shaped design but the saddle did not have enough medial-to-lateral stability, so the change is a good one. The INBONE total ankle replacement is unique in that it has multiple pieces that are screwed together to create a stem to go up into the tibia. To do so, a 6-mm hole is drilled from the plantar calcaneus up the calcaneus, then the talus, and into the tibia. The medullary portion of the tibia is then reamed out and the tibial components screwed into one another to form the stem. Added to the central stem on the INBONE II talar component are 2 anterior pegs that help control rotation. These are appropriate and the author has moved exclusively to INBONE II for his patients.

The technique for insertion of the tibial stem has required a leg holder with fluoroscopy.[5] There is a new way, however, to insert the INBONE total ankle replacement (Prophecy INBONE Pre-Operative Navigation Alignment Guides, Wright Medical Technology, Arlington, Tennessee). It involves getting a CT scan of a patient's ankle before the surgery and creating plastic molds. These molds are then placed on the bone in the open ankle for exact placement of the cutting jig pins. The plastic molds are removed from the cutting jib pins and the cutting jigs are then placed on the pins that also aid in placement of the long 6-mm drill. The bone can then be cut precisely without need for the leg holder. It is not yet in widespread use, so all the ankles discussed in this article have been done with the leg holder.

REASONS FOR FAILURE

The reasons for failure of the INBONE total ankle replacement include, but are not limited to, poor patient selection. Thus, placing a total ankle in a patient with peripheral vascular disease (can be occult) resulting in a large wound problem necessitates free flap coverage or amputation. At Duke University, the use of a radial forearm flap for severe wound problems has been successful. This has been done without any exchange of the prosthesis. Sending patients for a vascular consultation preoperatively, whenever the dorsalis pedis or posterior tibial pulse is not palpable, may save surgeons and patients a great deal of grief.

The next reason for failure is insertion of a total ankle replacement in patients with avascular necrosis of the talus, most likely from obvious trauma (talar neck fracture) but sometimes without a history of trauma. In **Fig. 1** there is atraumatic avascular necrosis of the talus. The patient has obvious arthritis of the ankle, including the subtalar joint, undergoes an INBONE total ankle replacement; and does well initially. At 6 months, there is some initial collapse of the talar component and 1 year later there is significant painful collapse of the talar component. She subsequently undergoes tibiotalocalcaneal arthrodesis with a retrograde locked compression intramedullary nail and femoral head allograft to fill the void and does well (**Fig. 2**).

I have also seen this phenomenon of talar collapse in all commercially available models of total ankle replacement when too much bone is resected from the talus. Salvage is then virtually impossible. Although the creators of the INBONE total ankle replacement contend that the drill evades the arterial supply of the talus, I believe that in some patients, unique patterning of the talar vascularity makes it susceptible to damage in a low-cut talus. In **Fig. 3**, a 73-year-old man undergoes an INBONE total