

An Assessment of Outcomes following Revision Total Ankle Arthroplasty: Incidence of Failure and Intervention Options

Isabel Rose Shaffrey, Katherine Margaret Kutzer, Alexandra Krez, Nicholas R Kiritsis, Kevin Adam Wu, Albert Thomas Anastasio, Conor O'Neill, Samuel Bruce Adams

INTRODUCTION:

Total ankle arthroplasty has continued to grow in popularity over recent years as an intervention for end-stage ankle osteoarthritis. While advancements in implant design and surgical technique have led to improved postoperative clinical outcomes and survivorship, complications following TAA persist. In the instance of implant failure following TAA, options for surgical intervention are primarily limited to revision TAA or conversion to ankle arthrodesis. Though the incidence of revision TAAs performed each year has continued to inevitably rise as utilization of TAA increases, current literature assessing outcomes following revision TAA is sparse and is largely limited to small case studies. As a result, the purpose of this study was to analyze clinical outcomes and incidence of failure following revision TAA performed at a single institution.

METHODS:

This was a retrospective review of patients who underwent revision TAA at a single institution between 2007 to 2024. Revision TAA was defined as the revision and exchange of at least one of the metal components following a primary TAA. Data collection was carried out through manual chart review to assess for patient demographics, surgical details, indications for revision TAA, primary TAA implant type, revision TAA implant type, and postoperative complications. The primary result of interest was incidence of failure following revision TAA. Revision TAA failure was defined as any cases that required explantation of one or both of the metallic revision components, including interventions such as repeat revision TAA, ankle arthrodesis, or below-knee amputation. Patient records were reviewed for etiology of the revision failure as well as time to failure. Statistical analysis was carried out using R software to assess for risk factors associated with revision TAA failure, with p-values less than 0.05 being considered statistically significant.

RESULTS:

There was a total of 211 patients who underwent revision TAA between 2008 to 2024 at our institution. The average time from primary TAA to revision TAA was 5.7 years and average follow-up following revision TAA was 2.8 years. The Inbone II implant was the most commonly used implant in the setting of revision TAA (n = 106, 50.2%), followed by a combination Inbone II/Invision implant (n = 26, 12.3%), then the Inbone I implant (n = 15, 7.2%). There were 35 patients who experienced failure following their revision TAA, representing an overall failure rate of 16.6%. Average time to revision failure was 3.1 years. Etiology of revision TAA failures included implant loosening (n = 11, 31.4%), avascular necrosis (AVN) of the talus (n = 8, 22.9%), and infection (n = 7, 20.0%). Interventions for failed revision TAA included repeat revision TAA (n = 21, 60.0%), arthrodesis (n = 10, 28.6%), including 3 tibiototalcalcaneal arthrodeses, below-knee amputation (BKA) (n = 3, 8.6%), and placement of an antibiotic spacer (n = 1, 2.9%). In the 21 cases of repeat revision TAA, 11 patients underwent exchange of both components, and 10 patients underwent exchange of the talar component only, with 5 patients receiving a total talus replacement (TTR) at the time of repeat revision. There were no cases of tibial-only repeat revision TAAs. Indications for BKA included persistent infection (n = 2) and traumatic injury (n = 1). Compared to the control cohort of revision TAAs, there were no significant differences in patient age, BMI, incidence of preoperative tobacco use, or incidence of preoperative diabetes.

DISCUSSION AND CONCLUSION:

The clinical outcomes following revision TAA are not well described in the current literature. This study evaluated the survivorship and patterns of failure following revision TAA at a single institution with a large volume of revision TAAs. Overall, outcomes following revision TAA were modest, with a demonstrated failure rate of 16.6% at a mean 2.8 years postoperatively. Following failure, our cohort demonstrated that many revision cases may be successfully rescued with limb salvaging procedures, including repeat revision TAA or conversion to ankle arthrodesis. Incidence of talar-sided failure was particularly notable in our cohort, with five patients undergoing TTR as a salvage procedure in the setting of talar collapse or avascular necrosis. Intervention with below-knee amputation was indicated in a limited set of patients who had persistent infection or trauma with an unsalvageable ankle joint. Ultimately, revision TAA demonstrated moderate short-term success with a 16.6% failure rate at approximately three years. Though salvage options are limited in the setting of revision failure, our study demonstrated that limb-sparing surgery is often feasible and may still achieve favorable results.