Early Osteolysis and Component Revision of Total Ankle Arthroplasty at Mid-Term Follow Up

Jacob Michael Perkins, Vincent Vacketta, Christopher Hyer[1]
[1]Orthopaedic Foot & Ankle Center

INTRODUCTION:

The use of total ankle arthroplasty (TAA) for the treatment of end-stage ankle arthritis has continued to grow in popularity as a favorable alternative to ankle arthrodesis. The developments of the fourth-generation implants have obviated a significant number of shortcomings observed with the early generation implants which have improved survivorship rates. Despite an overall reduction in complications with the fourth-generation implants, periprosthetic lucency (PPL) remains a persistent finding and its significance in long term outcomes is relatively unknown.

Among the newer fourth-generation implants released over the past decade is the CADENCE Total Ankle System which became available for clinical use in 2016. Our previous publication had revealed a concerning incidence of radiographic osteolysis of the CADENCE tibial component interface at a shorter term follow up of 24 months. As researchers, we strive not to bias or discriminate against good or poor outcomes and instead feel it important to share data, and though there were limited cases of symptomatic loosening or component revision in our earlier report, we were concerned this trend may worsen with longer follow up.

The purpose of this study was to evaluate the outcomes of a fourth generation TAA, the CADENCE Total Ankle System, with a minimum of 1-year follow up. In addition, we report the radiographic and clinical outcomes and early complications following the use of this fourth-generation implant.

METHODS:

This single center retrospective study evaluated 63 consecutive patients who underwent total ankle arthroplasty with the CADENCE Total Ankle System between August 2016 and October 2021 by a single fellowship trained foot and ankle surgeon and co-design surgeon. Patients were included in our study on the basis of at least one year of clinical and radiographic follow up; there were no other exclusion criteria.

RESULTS:

Fifty-four total ankle arthroplasty cases utilizing the CADENCE Total Ankle System in 50 patients were included in the current study. Preoperatively, eleven ankles had neutral alignment, 18 ankles demonstrated varus alignment, and 25 ankles demonstrated valgus alignment. Twelve patients underwent staged procedures, 3 for management of severe varus deformity and 9 for severe valgus deformity. Radiographic parameters changed significantly preoperatively to postoperatively.

At final follow up, PPL was demonstrated in 39 (72.2%) ankles in this cohort. Symptomatic PPL was present in 13.0% of ankles in this cohort. Talar subsidence was observed in 7 ankles within our cohort. Cysts were observed in 8 ankles (14.8%) at final follow up. All cysts were non-progressive and did not require grafting at the time of final follow up.

Nine ankles underwent subsequent operations related to TAA complications as coded by the COFAS guidelines. Seven ankles underwent revision procedures, resulting in a final implant survivorship of 87.0%. Four ankles underwent nonrevision reoperations resulting in a nonrevision reoperation rate of 7.4%. No additional complications were encountered within this cohort.

DISCUSSION AND CONCLUSION:

The results of our study demonstrate an overall survivorship of 87.0% at a mean follow up of 31.2 months. Nine ankles underwent subsequent operations related to TAA complications as coded by the COFAS guidelines. Our reported survivorship is lower than the current reports evaluating this prosthesis with similar follow-up periods.

In our present study we report a 72.2% incidence of PPL which remains higher than the rates previously reported for this implant. While the significance of PPL is still not yet understood, the significant rates reported in this study appear to influence the clinical outcomes and survivorship of this cohort.

In this study of 54 Cadence total ankle arthroplasties, we observed a high rate of component loosening and bone interface osteolysis over time. This ultimately led to poorer implant survivorship over time and a higher than acceptable revision rate as a result. Though the lead author is a co-designer of the Cadence implant, we believe it prudent to share our clinical findings and experience as we all gain further knowledge and understanding about implant design and TAA. Based upon our results, we have abandoned use of this particular prosthesis as the mid-term results fail to achieve parity with other TAA systems available on the market.