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### Comparison of Outcome in Isolated Non-Deformed End-Stage Ankle Arthritis between Ankle Replacement, Arthroscopic Ankle Fusion, and Open Ankle Fusion

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#### Summary

656 end stage arthritic ankles underwent total ankle replacement (TAR), arthroscopic ankle arthrodesis (AAA), or open ankle arthrodesis (OAA) and were followed prospectively for a minimum of two years. 212 COFAS Type 1 ankles (78 TAR, 42 AAA, 92 OAA) were analyzed. Ankle Osteoarthritis Scale total change (AOS  $\Delta$ ) scores were calculated from preoperative and final follow-up data, as were Mental (MCS) and physical (PCS) Short Form-36 (SF-36) component change scores. AOS  $\Delta$  scores were slightly better for AAA as compared to TAR, with both fairing significantly better than OAA.

#### Introduction

End-stage ankle arthritis is a disabling condition with similar effect on morbidity, pain, and loss of function as hip arthritis. OAA has been considered the gold standard for the treatment of end-stage ankle arthritis. AAA has gained momentum with better outcomes than OAA. The outcomes of TAR and fusion may change with the involvement of the surrounding joints or with intra articular or extra articular deformity. Historically, treatment of ankle arthritis with TAR has had less reproducible results and longevity. With the advent of newer designs ankle replacement is gaining favour. The purpose of this study is to compare the outcomes of TAR, AAA, and OAA with the AOS in isolated, non-deformed ankle arthritis.

#### Methods

212 COFAS Type 1 isolated arthritic ankles with  $< 10^\circ$  of intrarticular and extrarticular deformity without arthritis in the triple joint complex (ST, TN, or CC) were only included. Ankles with previous infection, hindfoot or ankle fusions, or arthroplasty were excluded. In total, 78 TAR (Hintegra), 42 AAA, and 92 OAA ankles followed for an average of 3.9 ( $\pm$ SD 1.7) yrs were analyzed in 55 females and 44 males above the age of 18. Mean age and BMI was 57.9 ( $\pm$ SD 11.4) yrs and 28.9 ( $\pm$ SD 4.9) kg/m<sup>2</sup> respectively. All procedures were performed by 6 foot and ankle surgeons at 4 major centres across Canada. The primary outcome measure was the AOS total change score (AOS  $\Delta$ ) and the secondary outcome measures were the MCS, PCS, and reoperations. Survivorship using removal of metal components for TAR or revision of the fusion were used as end points.

#### Results

There were no statistically significant differences in rates of diabetes, inflammatory arthropathy, smoking status, and follow up time between the three groups. There was a difference in mean patient age,  $p=0.002$ , with TAR 61.7[95%CI 59.5, 63.8]yrs, AAA 56.3[CI 53.2, 59.4]yrs, and OAA 55.4[CI 52.7, 58.0]yrs respectively. There was no significant difference in number of revisions,  $p=0.262$ . Revisions for TAR were 7.69[CI 0.64, 14.75]% and 5.43[CI 0.71, 10.16]% for OAA, with no revisions in the AAA group. Survival analysis is presented in table 1. PSC and MCS difference was not significantly different between

the three groups. AOS Tâ<sup>††</sup> scores were significantly better for TAR and AAA, p=0.002, with OAA fairing worse in comparison. AOS Tâ<sup>††</sup> scores were: TAR 32.2[CI 26.8, 37.5], AAA 40.5[CI 32.8, 48.3], and OAA 22.9[CI 17.5, 28.3]. Separate analysis of AOS Tâ<sup>††</sup> between TAR and AAA did not indicate significant difference, p=0.077, although AAA trended to be mildly better. However, AOS Tâ<sup>††</sup> was significantly better for TAR when compared to OAA alone, 0.028.

### Conclusion

Based on AOS Tâ<sup>††</sup> scores, TAR and AAA had significantly higher outcomes than OAA, with a non-significant trend for AAA to fair better as compared to TAR. In addition, AAA had a trend toward less revision and reoperations, although this too was not significant. TAR and AAA are relatively equal options for the treatment of end-stage Type 1 ankle arthritis.

