Comparison of Effect on Gait of Total Ankle Arthroplasty vs Ankle Fusion

Foot & Ankle Category: Ankle

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Introduction
Because of limited survivorship of Total Ankle Arthroplasty, (TAA) is still relatively contra-indicated in young patients. For them, and older patients with large deformity, arthrodesis is frequently recommended. This study compared the effect on gait of the li

Methods
A prospective study evaluated 28 patients undergoing two different Interventions: 14 with TAA and 14 with ankle fusion, for post-traumatic or primary osteoarthritis. Exclusion criteria for TAA were age <40 yo, coronal deformity > 12°. In addition comparison was made to 14 healthy age- and gender-matched controls. The TAA group underwent STAR (Scandinavian Total Ankle Replacement) and the Ankle Fusion Group (AF) a mini-open arthrodesis with 3 screw fixation. Patients had weight bearing radiographs, gait analysis and pedobarography preoperatively and at 1 year. The gait parameters, coronal and sagittal tibio-talar angles were measured based on the long axis of tibia. Statistical analysis used STATA 11. Independent-sample t-tests and chi-squares were conducted to compare baseline demographic characteristics (age, gender, diagnosis). Pre-intervention gait and kinematic parameters between three groups (ankle fusion (AF), total ankle arthroplasty (TAA) and healthy controls) were compared using one-way analysis of variance. The assessments of the impact of the two interventions were compared using a repeated-measures analysis of variance. Time and Intervention were both used as main effects because Intervention is insufficiently taken into account using independent sample t-tests alone, as might be assumed by simply comparing the two Intervention groups.

Results
Pre-operatively, there were no significant differences between the two treatment groups. Post-operatively, compared to AF, TAA showed significantly better temporospatial parameters and more normalized 1st and 2nd Rockers of the Gait Cycle. Using Time and Intervention as the main effects, the TAA group showed significantly better Sagittal plantarflexion, but not significantly improved overall sagittal ROM (15.01 vs 19.24), while the Ankle Fusion group showed significantly better Coronal ROM, especially eversion, (Table 1). The kinematic, kinetic and center-of-pressure (CoP) progression data demonstrates that post intervention both groups have similar Foot and Ankle resultant Centers of Rotation. While most, though not all, characteristics of gait were superior in the TAA group, this preliminary study showed objective data to demonstrate that Ankle Fusion in deformed ankle arthritis performs rather comparably to TAA in non-deformed ankle arthritis, at early followup. The explanation may be that the AF patients had compensatory hypermobility in the transverse tarsal and midfoot joints. The intermediate- and long-term effects on gait of arthrodesis vs. arthroplasty will require further study to examine both causes of and durability of the observed differences and similarities, in order to distinguish between the effects of the treatments compared to those of the underlying arthritis.
Conclusion
The Ankle Fusion group in deformed ankle arthritis performed relatively comparably to the TAA group in non-deformed ankle arthritis in gait parameters at early followup.