The Influence of Obesity on the Outcome of Total Ankle Arthroplasty

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Summary
Obesity represents a growing problem in developed countries, and has been suggested to be a risk factor for increased complications and poorer outcomes seen after total joint arthroplasty. Most of our knowledge about this problem stems from the hip and knee arthroplasty literature. Our prospective matched cohort study examines the influence of obesity on the outcome of total ankle arthroplasty, an area which to date has received little attention in the literature.

Introduction
Although controversial, some studies highlight obese patients as being at increased risk of complications and poorer outcomes after total joint arthroplasty. We report the influence of obesity on the clinical and functional outcome of patients who have undergone total ankle arthroplasty.

Methods
A prospectively collected database of total ankle arthroplasty patients was used to identify a group of obese patients (BMI >30kg/m2), using the following parameters. Inclusion criteria: (a) Post-traumatic or inflammatory arthritis; (b) Minimum two-year follow-up and (c) Coronal plane deformity less than 10 degrees. Exclusion criteria: (a) Co-morbidity affecting physical function and (b) Total joint arthroplasty (hip or knee) within one year of most recent follow-up.

A control group of non-obese individuals (BMI 18-30kg/m2) were determined by matching for age within 10 years, gender, diagnosis, implant and length of follow-up (within 1 year). This formed two groups for analysis: matched obesity and control.

American Orthopaedic Foot and Ankle Society (AOFAS), Ankle Osteoarthritis Scale (AOS) and SF-36 questionnaires were used preoperatively and at each follow-up visit. Revision was defined as removal and/or replacement of the metal components. Ancillary procedures were defined as any other post-operative intervention, including liner exchange. Complications were recorded.

Following testing for normality, paired t-tests were used to analyse outcome score improvement within each group, and unpaired t-tests used to detect differences in outcome scores between groups. Statistical significance was set at p<0.05.

Results
We identified 43 obese patients (46 ankles) (BMI > 30kg/m2), from the database. There were 23 females and 20 males, with a mean BMI of 34.7, mean age of 65.1 years and mean follow-up was 3.5 years (range 2-8). Four patients were lost to follow-up (one known revision). There were 4 revisions (8.7%); five isolated liner exchanges (10.9%) and one revision to fusion (2.2%). One patient underwent below knee amputation for complex regional pain syndrome (2.2%).

Applying the matching criteria to the above group of patients, we were able to one-to-one match 28 obese ankles to a control group. The matched obesity and control groups each contained 11 STAR, 11 Mobility and 6 Hintegra implants.

In the matched obesity group (n=28), the mean BMI was 35 and the mean preoperative coronal plane deformity was 4.9 degrees. There were three revisions (10.7%) at a mean of three years and three liner exchanges (10.7%), at a mean of 2.3 years. One patient was lost to follow-up (known to be revised).
Statistically significant improvements were noted with the AOFAS scores (33.5 to 80.6), the AOS pain and disability scores (58.8 to 25.7 and 68.4 to 35.1) and both physical and mental component scores of the SF-36.

In the control group (n=28), the mean BMI was 26.1 and the mean preoperative coronal plane deformity was 4.7 degrees. There was one revision (3.6%) at 1.5 years and two liner exchanges (7.1%), at a mean of two years. All patients were followed-up. Statistically significant improvements were noted with the AOFAS scores (32.4 to 80.1), the AOS pain and disability scores (46.5 to 17.1 and 58.5 to 27.5) and the physical component score of the SF-36. The mental component score of the SF-36 did not increase significantly (52.2 to 54, \( p=0.37 \)), although the same score pre-operatively was lower in the matched obesity group (45 vs. 52.2, \( p=0.193 \)).

Overall, no difference was found in mean outcome score improvement between groups. The mean preoperative AOS pain and disability scores in the matched obesity group were higher (58.8 vs. 46.5) \( (p=0.016) \) and (68.4 vs. 58.5) \( (p=0.082) \) respectively. The matched obesity group also displayed higher mean postoperative AOS pain and disability scores, although not reaching statistical significance \( (p=0.096 \text{ and } p=0.241 \text{ respectively}) \).

There were no intraoperative complications. Delayed wound healing affected one patient in each group. There were no deep infections in either group.

Conclusions

Obesity results in greater functional and psychological burden reflected by the lower preoperative AOS and mental component SF-36 scores. Nevertheless, the overall improvement in functional outcome is comparable to non-obese matched controls. Obese patients should be educated that a significantly higher revision rate (10.7% vs. 3.6%) can be expected within five years of surgery.