Mid-Term Revision Rates for a Semi Constrained Ankle Replacement Compared to a Mobile Bearing Ankle Replacement for Aseptic Loosening

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**Introduction**
Treatment of end stage ankle arthritis includes the use of ankle joint replacement for specific indications. Ankle replacement has had a higher revision rate than hip and knee joint replacements, mainly due to aseptic loosening. In hip and knee replacement micromotion demonstrated by RSA analysis has been associated with aseptic loosening. We wished to determine if the difference in failure rate secondary to aseptic loosening of two different designs for which we have cadaver information on implant stability at the time of implantation.

**Methods**
At two institutions participating in a national database, one surgeon performing 135 semi constrained beaded ingrowth surface implants (implant A) from 1999 to 2005, and two surgeons performed 113 titanium plasma spray mobile bearing replacements (implant B) from 2000 to 2005. All operative reports of revision surgery were reviewed to identify loose metal components. The revision rate for aseptic loosening of metal components was compared at 6 to 11 years follow up. Revisions for sepsis or for fracture of the polyethylene component were excluded. Comparisons were made between ankles (implant A vs implant B) and between components (tibia vs talus). The revision rate for aseptic loosening was compared using Fisher’s exact test.

**Results**
There was a significantly higher rate of revision of implant A for aseptic loosening compared to implant B. Of the 113 Implant B’s 7 were revised on the talar side for aseptic loosening, and 2 on the tibial side. For the 135 implant A’s 24 talar components and 16 tibial components were revised for aseptic loosening (p<0.005). There was a higher rate of failed total number of components for implant A (p<0.0001) with 40 failed components at revision out of 270, vs 9 out of 226 for implant B. There was also a higher rate of aseptic loosening in Implant A between the talus and the tibia (p<0.005).
Conclusion
We have performed a cadaver study showing increased micro motion of implant A compared to implant B. We also showed increased motion in implant A's talar component compared to the tibial component. The implants studied in the Cadaver study were implanted using the same techniques as used for this clinical series. This is the first time that we are aware of for any joint replacement (hip, knee, elbow, shoulder or ankle) that increased micro motion in a cadaver model has been positively associated with aseptic loosening rates. A weakness of the study is that another unstudied variable may have caused the higher revision rate in implant A. However this would not explain the increased rate of revision of implant A's talus compared to the tibial component. This provides evidence to indicate that replacements should be designed so that immediate bony stability is achieved at the time of implantation. New designs should adhere to this principle, and surgeons should select ankle joint replacements carefully with this information in mind.