Abstract #1958

Bone Mineral Density Changes Following Total Ankle Replacement With an Uncemented, Stemmed Prosthesis: A Prospective Cohort Study

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Introduction/Purpose: Strong peri-prosthetic bone is mandatory for the survival of joint replacements. This has been proven in studies of total hip and knee replacement. It is hypothesised that this should be equally important in the survivorship of Total Ankle Arthroplasty (TAR). Despite observable bone preservation on postoperative radiographs, there is a paucity of literature on changes of bone mineral density (BMD) around the ankle following TAR. This prospective study used Dual Energy X-ray absorptiometry (DEXA) to quantify the BMD in different regions of the surrounding bones adjacent to the stemmed tibial and the talar components of un-cemented TAR prosthesis.

Methods: We conducted a prospective cohort study in patients undergoing TAR with an uncemented, stemmed tibial component mobile bearing prosthesis in our tertiary referral centre. Patients who underwent a TAR between March 2008 and April 2009 were included and were part of a randomized controlled trial of TAR. Ethics committee approval was obtained. All operative procedures were performed by one consultant surgeon, using a standardised operative technique. DEXA scans of the ankle were assessed preoperatively and repeated at one and two years postoperatively. Ankles were scanned using a HOLOGIC DXA scanner. Seven rectangular regions of interest (ROI) were positioned on the AP view of the first post-operative image (Fig 1). The template analysing the ROI for the first post-operative scan was then used for analysis of the preoperative and subsequent post-operative scans using the HOLOGIC software. This technique produced identical areas of interest for each scan to allow the results to be compared.
**Results:** 23 patients underwent TAR for end stage osteoarthritis. The mean age of participants was 63.3 years (SD 9, range 43 to 80). Seven female and 15 male patients were included with one male patient undergoing bilateral TAR. The mean BMD within the lateral malleolus (R2) decreased significantly from 0.5g/cm² to 0.42g/cm² (17%, P < 0.01), at one and two years postoperatively. There was an increase in the BMD at the medial side (R6) of the metaphysis of 0.07 g/cm² (7%, P=0.02) and the mean BMD within medial malleolus decreased from 0.67g/cm² to 0.64 g/cm² (4%), but this was not statistically significant. There were small increases in BMD in the tibia, immediately proximal to the implant (R7) and at the talus (R5) which were not statistically significant.

**Conclusion:** There was stress shielding over the lateral malleolus resulting in decrease BMD in lateral malleolus and to a lesser extent of the medial malleolus. The increase in BMD at the medial tibial metaphysis indicates an increase in mechanical stresses in that region. This may explain the occasional postoperative stress fracture of the medial malleolus or medial sided ankle pain. There was no further change in BMD from year 1 to year 2 following TAR suggesting the majority of remodelling has occurred within the first year.