

Preoperative Templating in Total Ankle Replacement - A Case for 3D Imaging

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Introduction/Purpose: Pre-operative templating using plane radiographs is of great importance in planning arthroplasty of the hip and knee. Its role in total ankle arthroplasty (TAR) is less clear. Being able to use the best fitting implant is of paramount importance for transferring forces through the ankle joint. This contributes to the longevity of the TAR prosthesis. It is unclear whether pre-operative templating is more accurately performed using an AP radiograph or 3-Dimensional (3D) imaging using MRI or CT. We sought to compare the accuracy of pre-operative templating with an AP radiograph versus CT/MRI, in relation to the size of the implanted prosthesis.

Methods: 29 patients undergoing TAR with BOX™ TAR between July 2014 and September 2015 were included in the study. Data was collected prospectively using a TAR database. Pre-operative templating of Tibial and Talar width using AP Radiographs was performed and recorded onto the database (Fig1). The implant sizes used was also recorded in the database (small, medium or large). Patients were part of an ongoing clinical trial which has ethics committee approval. 26 patients in this cohort underwent pre-operative CT or MRI assessment and were suitable for inclusion in the study (CT=6, MRI =20). These scans were reviewed retrospectively by two separate authors (AF and JR) to assess for Tibial and Talar width in the Coronal plane at the midpoint of the Tibia in the Sagittal plane (Fig2). A third author (MS), the lead surgeon, resolved any disagreements on measurements. The authors were blinded to the implant size used.

Results: For templating the Tibial width the AP radiograph predicted the implant size 42.3% of the time while using CT/MRI scan predicted the implant size correctly 80.8% of the time. For templating the Talar width the AP radiograph predicted the implant size 42.3% of the time while using CT/MRI scan predicted the implant size correctly 84.6% of the time. The odds ratio for CT/MRI predicting the implant correctly over the AP radiograph was 5.72 (CI = 1.7 – 19.9) for the tibial component and 7.50 (CI = 2.0-28.0) for the talar component. These values were statistically significant.

Conclusion: For pre-operative templating we found 3D templating with an MRI or CT scan to be significantly more accurate than using an AP radiograph. We advise the use of MRI or CT as the most effective way to plan for TAR. MRI and CT are now frequently performed in orthopaedic centres as routine investigations. These modalities have the added benefit of assessing surrounding joints and soft tissues to aid accurate diagnosis. The limitations of this study lie in the small study size and the retrospective methodology.

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