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Accuracy of patient-specific instrumentation in total ankle arthroplasty: a comparative study

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ABSTRACT

Introduction: Correct positioning of implants in total ankle arthroplasty (TAA) is a key step to ensure the longevity of the prosthesis. Patient-specific instrumentation (PSI) via preoperative computed tomography for TAA was developed and made available through PROPHECY (Wright Medical, Memphis, TN). The purpose of this study was to compare the use of PSI with the standard referencing guide (SRG) in regard to the accuracy of tibial implant positioning, operative time, and fluoroscopy time.

Methods: A retrospective analysis of 99 patients who underwent a primary TAA with the INFINITY prosthesis (Wright Medical, Memphis, TN) was performed. Patients were divided in two groups based on the type of instrumentation used during the TAA (75 in the PSI - PROPHECY group vs 24 in the SRG group).

Results: Tibial implant positioning was similar between groups. In the coronal plane, the absolute deviation of the tibial implant was 1.7 ± 1.4 degrees for the SRG and 1.6 ± 1.2 degrees for PSI ($P=0.710$). In the sagittal plane, the absolute alignment deviation of the tibial implant was 1.8 ± 1.4 degrees for the SRG and 1.9 ± 1.5 degrees for PSI ($P=0.675$). Operative time ($P=0.040$) and fluoroscopy time ($P<0.001$) were significantly decreased in the PSI group. The PSI preoperative plan report correctly predicted the implant size in 73% of cases for the tibial component and in only 51% of cases for the talar component.

Conclusions: PSI provided similar tibial component alignment to standard instrumentation while decreasing the operative and fluoroscopy time. However, PSI preoperative plan reports were poor predictors of implant sizing. Therefore, the final decision should always be based on the surgeon's experience to prevent errors in implant sizing and positioning.

Keywords: Arthroplasty, replacement, ankle; Patient-specific instrumentation; Component alignment.

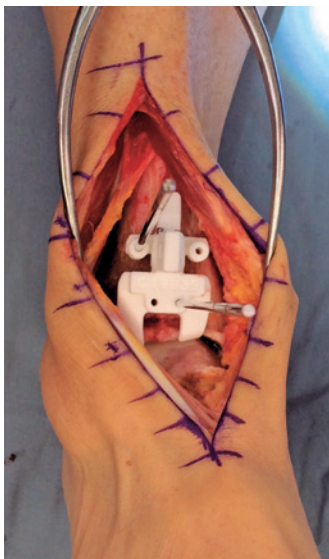


Figure 1. PROPHECY tibial alignment guide.
Source: Author's personal archive.

