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Patient-specific instrumentation benefits for INBONE II total ankle arthroplasty

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Introduction: Total ankle arthroplasty reduces pain and improves mobility, but long-term success depends on accurate implant alignment and sizing. The PROPHECY patient-specific instrumentation (PSI) system was designed to enhance preoperative planning and precise placement of the INBONE II implant. This study evaluated the accuracy of PROPHECY in predicting implant size and alignment and compared outcomes with the standard jig technique. We hypothesized that PSI would improve alignment accuracy and deformity correction.

Methods: A retrospective matched study of 92 patients was conducted at a single institution, including 46 PSI and 46 non-PSI cases who were implanted with INBONE II. Groups were matched by age and sex. Demographic data, implant sizes, operative time, tourniquet time, and fluoroscopy time were collected. Pre- and postoperative radiographs were analyzed to compare implant alignment in the PSI group with the planned alignment and to evaluate postoperative tibiotalar angle and talar tilt in both groups.

Results: PROPHECY predicted implant size accurately in 68 percent of talar and 89 percent of tibial components, with most changes involving a one-size downsizing of talar components. Median absolute deviation from the planned alignment in the mortise and sagittal planes was less than 2°, demonstrating accurate execution of the preoperative plan. In both groups, the median postoperative tibiotalar angle deviation was less than 2°, and the talar tilt was 1° or less. Fluoroscopy time was similar between groups, but the PSI group had longer operative and tourniquet times.

Conclusion: For INBONE II implantation, PSI achieved alignment and sizing comparable to standard instrumentation. Longer operative time likely reflects early experience with PSI guides.

Keywords: Arthroplasty, replacement, ankle/instrumentation; Ankle joint; Arthritis; Patient reported outcome measures.

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