

Pre-Operative planning with Computed Tomography (CT) and transfer technology results in reproducible glenoid baseplate inclination in reverse shoulder arthroplasty

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Abstract:

Purpose: To determine the reliability of CT-based pre-operative planning with transfer technology in achieving desired glenoid prosthesis inclination in reverse shoulder arthroplasty.

Methods: In an effort to determine the reliability of measuring glenoid inclination on x-ray, we first completed a validation study. Glenoid inclination was measured by 2 independent examiners on Grashey view x-rays and was validated against the inclination value based on CT scans.

Six-week post-operative x-rays were collected retrospectively for patients who underwent reverse total shoulder arthroplasty using preoperative planning and a guidepin transfer technology from two surgeons at a single academic institution. Power analysis was performed to determine the sample size. The ability to measure post-operative component inclination was assessed and intraclass correlation coefficient (ICC) was used to determine inter-rater and intra-rater agreement. The post-operative inclination values were compared to the planned inclination as determined by CT-based pre-operative planning software, with and without glenoid augmentation. The average deviation from planned was calculated for the data set with a 95% confidence interval.

Results: Inter-rater reliability ICC was 0.81, Intra-rater reliability was 0.81 and 0.95 for each rater respectively. Pre-operative native inclination values from the planning software was not significantly different from inclination measured on pre-operative x-rays ($p > 0.05$). The mean deviation in inclination from pre-operative plan was 2.8 degrees and 3.4 degrees for non-augmented and augmented glenoid components, respectively.

Conclusions: Glenoid component inclination can be reliably measured on pre-operative and post-operative radiographs. A CT-based planning software with transfer technology reliably results in a mean glenoid inclination that is within four degrees of the preoperatively planned value. There is a trend of more variation from planned inclination in patients receiving an augmented glenoid component when compared to a non-augmented component.