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The Influence of Three-Dimensional Planning on Decision-Making in Total Shoulder Arthroplasty

Birgit S. Werner, MD, Robert Hudek, MD, Klaus J. Burkhart, MD, Frank Gohlke, MD

Full article can be found at: <http://www.sciencedirect.com/science/article/pii/S1058274617300198>

MANUSCRIPT ABSTRACT

Background:

Long-term results and complication rates in shoulder arthroplasty are related to implant positioning. Current literature reports increased precision in glenoid component positioning using 3-dimensional (3D) computed tomography (CT) planning tools. This study evaluated the accuracy of glenoid version and inclination measurements using 2D CT scans compared with a validated 3D software program and its influence on decision making on implant selection.

Methods:

Preoperative CT scans were obtained from 50 patients undergoing total shoulder arthroplasty. Glenoid version and inclination measurements were performed in random order by 3 independent qualified orthopedic surgeons on reformatted 2D CT scans. Indication for anatomic or reverse shoulder arthroplasty was based on glenoid deformity and on rotator cuff conditions. Results were compared with those from a validated 3D computer software program, and the final decision was made according to the 3D planning.

Results:

Mean preoperative glenoid retroversion on reformatted 2D CT scans was $11.9^{\circ} \pm 9.6^{\circ}$ and mean superior inclination was $10.7^{\circ} \pm 8.6^{\circ}$. When the 3D software was used, glenoid retroversion averaged $15.1^{\circ} \pm 10.6^{\circ}$ and superior inclination averaged $8.9^{\circ} \pm 9.9^{\circ}$. The 2D CT demonstrated good interobserver and intraobserver reliability for glenoid version and inclination. Decision on the choice of implant was adjusted in 7 patients after the 3D planning.

Conclusions:

Our findings show that measurements of glenoid version and inclination on reformatted 2D CT scans are less accurate compared with 3D measurements. A preoperative 3D planning software allows for improvement of virtual glenoid positioning and influences the decision making process.

KEY TAKEAWAYS

- 1** Planning with BLUEPRINT™ 3D Planning + PSI changed the choice of implant between anatomic and reversed in 7 out of 50 cases (14%).

Why is this important?
BLUEPRINT is a tool to help surgeons make better, more informed decisions.
- 2** Out of those 7 patients, the definitive implant was changed from anatomic to reverse in 4 patients and from reverse to anatomic in 3 patients after 3D CT planning.

Why is this important?
Particularly for the patients who were switched from reversed to anatomic, a 5-10 minute preop plan resulted in preserving bone in case of future revisions.
- 3** 3D preoperative planning allows for improvement of virtual glenoid positioning and influences the decision making process.

Why is this important?
The precision and accuracy of the pre-clinical plan will dictate the quality of the clinical outcome.

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10801 Nesbitt Avenue South
Bloomington, MN 55437
888 867 6437
952 426 7600
www.wright.com

161 Rue Lavoisier
38330 Montbonnot Saint Martin
France
+33 (0)4 76 61 35 00