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

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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° ± 9.6° and mean superior inclination was 10.7° ± 8.6°. When the 3D software was used, glenoid retroversion averaged 15.1° ± 10.6° and superior inclination averaged 8.9° ± 9.9°. 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.