Evaluation of the baseplate position and screws in reverse total shoulder arthroplasty using patient-specific instrumentation

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INTRODUCTION:
Recently, patient-specific instrumentation (PSI) in shoulder arthroplasty has been conducted to translate preoperative surgical planning into real implant positioning. However, screws for baseplate fixation using PSI have not been planned preoperatively or verified for the proper location and length. Purposes of this research are reproducibility of the 3D printed PSI system for the postioning of the baseplate and screws in reverse total shoulder arthroplasty (rTSA) and the role of preoperative planning of the screw.
METHODS:
Postoperative computed tomography (CT) data from 30 consecutive patients who underwent primary rTSA using PSI were collected. After ideal position planning of the baseplate and screws, the PSI guide was manufactured using 3D printing. On postoperative CT, version, inclination, and translation of baseplates were evaluated. The length and angle of insertion of all screws were measured, and penetration of the spinoglenoid and suprascapular notch with screws was investigated.
RESULTS:
The mean differences in real implantation from planning in version was 2.7±5.8°; in inclination, 0.9±3.5°; and in rotation, 1.0±5.4°. The mean translation from the planning was 1.7±1.0 mm. The mean screw antero-posterior angulation difference of the screws was -0.5±6.4° for the anteroposterior and -1.4±7.1° for the superior-inferior direction. There was no possiblity of nerve injury due to supra scapular notch involvement. The posterior screw for the baseplate was abandoned in 93.3% of patients, since it was too close to the suprascapular nerve, or the screw length was too short for sound purchase of the bone (mean length: 9.3±2.0 mm).
DISCUSSION AND CONCLUSION:
Preoperative planning and PSI help perform surgery as planned even for the proper screws insertion as well as baseplate position. The posterior screw has a limited role in terms of length and direction.