EP.06.020

GLENOID COMPONENT PLACEMENT ACCURACY IN TOTAL SHOULDER ARTHROPLASTY WITH PREOPERATIVE PLANNING AND STANDARD INSTRUMENTATION IS NOT INFLUENCED BY SUPERO-INFERIOR GLENOID EROSION

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Background: Accurate glenoid component placement in total shoulder arthroplasty (TSA) is often difficult even with the use of preoperative planning. Computer navigation and patient-specific guides increase component placement accuracy, but which patients benefit most is unknown. We assessed surgeons' accuracy in placing a glenoid component in-vivo using 3-dimensional preoperative planning with standard instrumentation for different glenoid erosion patterns.

Methods: We retrospectively reviewed of 170 primary TSAs performed at a single institution. Commercially-available preoperative planning software was used in all arthroplasties with multiplanar 2-dimensional computed tomography and a 3-dimensional implant overlay. After registration of intraoperative bony landmarks to the navigation system, participating surgeons with knowledge of the preoperative plan were blinded to the navigation screen and attempted to implement their preoperative plan by simulating placement of a central-axis guide pin. 230 screenshots of surgeon's simulated guide pin placement were included (aTSA=66, rTSA=164). Displacement, error in version and inclination, and overall malposition from the preoperatively-planned target point were stratified by the Favard classification describing superior-inferior glenoid wear: E0(n=89)=superior humeral migration with no glenoid erosion; E1(n=81)=concentric glenoid erosion; E2(n=29)=glenoid erosion predominantly in the superior pole; E3(n=29)=global glenoid erosion more severe in the superior pole; E4(n=2)=glenoid erosion predominantly in the inferior pole. Components were considered malpositioned for version/inclination errors >10° or displacement from the starting point >4 mm.

Results: Overall, the mean displacement error was 3.5±2.7mm (aTSA=2.7±2.3mm, rTSA=3.8±2.9mm), version error was 5.7±4.7° (aTSA = 5.8±4.4°, rTSA = 5.7±4.8°), inclination error was 7.1±5.6 (aTSA = 4.8±4.8°, rTSA = 8.1±5.7°), and malposition rate was 53% (aTSA=38%, rTSA=59%). None of our outcomes differ based on Favard classification: displacement error (P=0.829; E0=3.5±3.0mm, E1=3.4±2.8mm, E2=3.2±1.9mm, E3=3.8±2.4mm, E4=2.0±0.4mm), version error (P=0.297; E0=6.0±4.9°, E1=6.2±5.0°, E2=4.6±3.7°, E3=4.6±3.7°, E4=4.5±4.9°), inclination error (P=0.764; E0=7.2±5.6°, E1=6.6±5.7°, E2=7.4±5.6°, E3=8.2±5.7°, E4=6.0±5.7°), and malposition rate (P=0.381; E0=53%, E1=51%, E2=48%, E3=66%, E4=0%). Additionally, outcomes did not differ when stratified by type of TSA.

Conclusions: Glenoid component displacement, version error, inclination error, and overall malposition did not differ based on supero-inferior glenoid morphology as defined by the Favard classification. Malposition was relatively high in our cohort, suggesting that surgeons should consider alternate techniques beyond preoperative planning and standard instrumentation when performing shoulder arthroplasty.