2020 Annual Conference Abstract Submission

PRESENTATION TITLE:
Inferior Tilt of the Baseplate Decreases Impingement-Free Range of Motion in Reverse Shoulder Arthroplasty – A 3-D Digital Motion Analysis

IF NOT ACCEPTED FOR PODIUM PRESENTATION, IS POSTER PRESENTATION ACCEPTABLE?
Yes

LIST ANY DEVICES NOT CURRENTLY APPROVED FOR USE BY THE FDA:
N/A

STRUCTURED ABSTRACT (PURPOSE, METHODS, RESULTS, AND CONCLUSIONS) IN LESS THAN 400 WORDS:

Introduction: Inferior tilt of the baseplate was originally proposed to improve baseplate fixation, but subsequent studies have produced conflicting results regarding the effect of inferior tilt on impingement and notching. We hypothesized that inferior tilt does not affect impingement. The secondary effects of glenosphere lateralization and diameter, and neck-shaft angle on impingement were also evaluated.

Methods: Twenty patients without glenoid bone loss undergoing RSA at a single institution underwent thin-slice computed tomography (CT) scans of the entire scapula and proximal humerus for preoperative three-dimensional planning in Blueprint (Wright Medical, Bloomington, MN). For each patient, a 25mm glenoid baseplate (PERFORM Reversed, Wright Medical, Memphis, TN) was digitally implanted along the inferior margin of the glenoid, centered anterior-to-posterior, matching the patient's existing version, with full backside contact. Impingement-free range of motion (ROM) was then simulated with 16 different implant configurations: baseplate tilt (0° versus -10°), glenosphere lateralization (0 versus +6mm), glenosphere size (36mm versus 42mm), and neck-shaft angle (NSA) (135° versus 145°). The primary endpoint was external rotation at the side, based on in-vivo analyses that reveal that notching occurs primarily with external rotation at the side.1 Data was compared with paired t-tests, and a multivariable regression analysis.

Results: Inferior tilt of the glenoid component was associated with a mean 27% decrease in impingement-free external rotation ($p<0.01$ in all cases) (Table 1). The magnitude of this effect was greatest in medialized glenospheres (2.8x), less in smaller glenospheres (1.7x), and least in more valgus humeri (1.3x). Multivariable regression analysis showed that offset had the most impact on impingement-free external rotation ($\beta = 0.473$, $p<0.001$), followed by glenosphere size ($\beta = 0.427$, $p<0.001$), neck-shaft angle ($\beta = -0.328$, $p<0.001$), and inclination ($\beta = 0.206$, $p<0.001$).

Conclusion: Inferior tilt of the baseplate led to a consistent decrease for every implant configuration in impingement-free external rotation at the side, which is the primary mode of in-vivo notching. The effect is magnified when using a medialized glenosphere, a smaller glenosphere, and/or a more valgus humeral component.