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Effect of critical shoulder angle, glenoid lateralization and humeral inclination on ROM in reverse shoulder arthroplasty

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Introduction:

Recent studies used computer simulations to determine effects of humeral and glenoid variations on range of motion (ROM) and bony impingements after reverse shoulder arthroplasty (RSA), but none investigated how different configurations of lateralization or neck shaft angle (NSA) affect shoulder ROM in different scapular morphologies. The purpose of the present study was therefore to evaluate the effects of lateralization of the center of rotation (COR) and NSA on shoulder ROM after RSA in patients with different scapular morphologies.

Methods:

3D-computer models were constructed from computed tomography scans of 12 patients with CSA of 25°, 30°, 35° and 40°. For each model, shoulder ROM was simulated and evaluated at a NSA of 135° and 145° and lateralization of 0mm, 5mm and 10mm for 7 standardized motions: glenohumeral abduction, adduction, forward flexion, extension, internal rotation with the elbow at 90° of abduction, as well as external rotation with the arm at 10° and 90° of abduction.

Results:

In all models, CSA did not seem to influence ROM, but greater lateralization achieved greater ROM for all motions in all configurations. Internal and external rotation at 90° of abduction were impossible in most configurations, except in models with 25° CSA.

Conclusions:

Post-operative ROM following RSA depends on multiple patient and surgical factors. This study based on computer simulation suggests that there is no influence of CSA on ROM after RSA, while lateralization increases ROM in all configurations. Furthermore, increasing subacromial space is important to grant sufficient rotation at 90° of abduction. In summary, increased lateralization of the

center of rotation and increased subacromial space improve range of motion in all CSA configurations.