

Up to 8mm of Glenoid-Sided Lateralization Does Not Increase the Risk of Acromial or Scapular Spine Stress Fracture following Reverse Shoulder Arthroplasty with a 135° Humeral Component

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INTRODUCTION:

Despite the proliferation of reverse shoulder arthroplasty (RSA), acromial and scapular spine stress fractures remain a common complication which negatively impact ultimate functional outcome. While glenoid-sided lateralization decreases bony impingement and improves rotational range of motion, some authors have suggested that it increases the risk of stress fracture. The purpose of this study was to assess the risk for stress fracture following RSA with a 135° inlay humeral component and varying amounts of glenoid-sided lateralization.

METHODS:

A retrospective review was performed from a multicenter prospectively collected database to identify patients who underwent primary RSA from 2015-2021. RSAs were performed with a 135° inlay humeral component in all cases. On the glenoid side, varying amounts of lateralization were used from 0 to 8 mm in 2 mm increments based on surgeon preference. Preoperative radiographs were reviewed for the presence of acromial thinning, acromiohumeral distance (AHD), and inclination according to the beta angle. Postoperative implant position (distalization, lateralization, and inclination) as well as the presence of acromial and scapular spine fractures were evaluated on minimum 1-year postoperative radiographs. Regression analysis was performed on component and clinical variables to assess for factors predictive of fracture.

RESULTS:

Acromial or scapular spine fractures were identified in 26 out of 470 shoulders (5.5%). The incidence of fracture did not vary based on glenoid-sided lateralization (0-2mm - 7.4%, 4mm - 5.6%, 6mm - 4.4%, 8mm - 6.0%; $p > .05$ for all comparisons). While there was no difference in mean postoperative AHD between groups ($p = .443$), the delta AHD or pre- to postoperative change was higher in the stress fracture group (2.0 +/- 0.7 cm vs. 1.7 +/- 0.7 cm; $p = 0.015$). For every 1 centimeter increase in delta AHD, there was a 164% risk increase for fracture (OR 2.64, 95% CI 1.28-5.46; $p = 0.002$). Additionally, for every millimeter increase in glenosphere overhang, there was a 22% increase in fracture risk ($p = 0.015$). RSA on the dominant extremity was predictive of fracture (OR 2.51, 95% CI 1.21-5.22 $p = 0.035$), but there was no relationship between patient age, sex, preoperative acromial thinning, or diagnosis and the risk of fracture.

DISCUSSION AND CONCLUSION:

Up to 8 mm of glenoid-sided lateralization does not increase the risk of acromial and scapular spine stress fracture when combined with a 135° inlay humeral implant. Humeral distalization increases the risk of stress fracture, particularly when there is a larger change between pre- and postoperative AHD or postoperative glenosphere overhang relative to the glenoid. In the setting of preoperative humeral migration, particularly for surgery on the dominant arm, it may be a consideration to alter surgical technique and aim for less postoperative distalization, but minimizing bony impingement via glenoid sided lateralization appears to be safe.

Table 1: Stress Fracture Rate Based on Glenoid Lateralization

Glenoid lateralization	Acromial or scapular spine fracture	%
0-2mm (54 patients)	4	7.4
4mm (195 patients)	11	5.6
6mm (137 patients)	6	4.4
8mm (84 patients)	5	6.0