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HUMERAL LENGTHENING AND CLINICAL OUTCOMES AFTER REVERSE SHOULDER ARTHROPLASTY: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background: While biomechanical studies have demonstrated an improved range of motion (ROM) and a greater risk of acromial fractures and nerve injury with increased humeral lengthening in reverse shoulder arthroplasty (RSA), clinical evidence is variable. We systematically-reviewed the relationship between humeral lengthening and clinical outcomes after RSA with stratification by measurement method and implant design.

Methods: This review was performed per PRISMA guidelines. PubMed, Cochrane Trials, and Embase were queried for articles evaluating the relationship between humeral lengthening and ROM, strength, outcome scores, and pertinent complications (acromial and scapular spine fractures, nerve injury). The relationship between lengthening and outcomes was reported descriptively and stratified by method of assessing humeral lengthening and implant design. Meta-analysis was performed to compare lengthening between patients with and without fractures using a random-effects model.

Results: Of 711 studies screened, 22 studies reporting on 2,393 shoulders were included (weighted mean age=73 years, follow-up=28 months, 66% female). Of studies that assessed forward elevation (n=11), six identified a positive, one identified a negative, and four identified no association with lengthening. The study identifying a negative association utilized an inlay-humerus and globally-medialized design. Of studies assessing internal rotation (n=9), external rotation (n=7), and abduction (n=4), all identified a positive or lack of association with lengthening. Studies assessing outcome scores (n=11) found either a positive (n=5) or no (n=6) association with lengthening. One study assessed nerve injury and identified a positive association with lengthening. Of studies assessing fractures (n=6), two identified a positive, one identified a negative, and three identified no association with lengthening. The two studies that identified a positive association demonstrated a 4.5mm [95%CI=0.7-8.3, p = 0.02] greater acromion-to-deltoid-tuberosity distance in patients with versus without fractures; however, no difference was found for the acromiohumeral distance. No clear trends were found between outcomes and lengthening measures or implant design.

Conclusions: The relationship between humeral lengthening and clinical outcomes after RSA remains unclear. While most studies report either a positive or no association between lengthening and outcomes, a minority present conflicting data showing increased lengthening associated with decreased forward elevation, higher incidence of nerve injury, and increased incidence of acromion fractures.