

Editorial Commentary: #Fakeradiographicangle—Critical Shoulder Angle, Like Acromioplasty, May Not Be Critical



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Abstract: The critical shoulder angle (CSA) is found to have an association with rotator cuff tearing when the angle is greater than 35° to 38°. However, the CSA does not correlate with improved clinical patient outcome scores. Acromioplasty is no longer viewed as a critical part of rotator cuff surgery. Only meaningful comparative studies will allow us to conclude whether performing a lateral acromioplasty for a significant CSA will be an important step to prevent future retears after rotator cuff repair.

See related article on page 3135

To raise new questions, new possibilities, to regard old problems from a new angle, requires creative imagination and marks real advance in science.

Albert Einstein

It is time once again to take out your goniometer and measure the critical shoulder angle (CSA) on your anteroposterior (AP) shoulder radiograph prior to cuff repair to determine whether the lateral acromion should be resected? Or is it not? Somehow, it seems like only yesterday that a flat (type I), curved (type II), or hooked (type III) acromion had to be appraised on the supraspinatus outlet radiographic view as an index for cuff pathology.¹ And then the myth was dispelled.

Historically, acromial extrinsic mechanical impingement as a source of rotator cuff wear has been the focus of many radiographic studies. The acromial slope as described by Bigliani et al.^{1,2} and Kitay et al.³ and acromial tilt as described by Kitay et al. and Aoki et al.⁴ sourced the anteroinferior aspect of the acromion as an anatomic basis for cuff pain. The lateral aspect of the acromion as the extrinsic site to address was popularized by 2 radiographic measurements: the lateral acromial angle and the acromion index.^{5,6} Balke et al.⁷

reported that a “low lateral acromial angle and a large lateral extension of the acromion were associated with a higher prevalence of impingement and rotator cuff tears.”

Then, the acromion index evolved to the CSA. Moor et al.^{8,9} determined that this angle is established on the AP radiograph from a line connecting the superior margin of the glenoid to the inferior margin of the glenoid and a line connecting the inferior margin to the lateral edge of the acromion. The angle is complicated somewhat by its relation to glenohumeral arthritis.

This concentration on the extrinsic cause of cuff tearing is challenging because the pendulum has swung from an extrinsic cause of rotator cuff tearing, as outlined by Neer,¹⁰ to an intrinsic apoptotic cause of degenerative cuff tearing. Perhaps the CSA, which connects rotator cuff tearing to glenohumeral osteoarthritis, is equivalent to the string theory of quantum mechanics that provides a means of uniting gravity to particle physics. The glenoid inclination might explain a potential disconnect in the bursal and articular fibers of the rotator cuff as the arm is abducted and externally rotated. To quote Kurt Vonnegut: “So it goes.”

The article entitled “The Relationship Between the Critical Shoulder Angle and the Incidence of Chronic, Full-Thickness Rotator Cuff Tears and Outcomes After Rotator Cuff Repair: A Systematic Review” by Docter, Khan, Ekhtiari, Veillette, Paul, Henry, and Leroux¹¹ correctly directs us to hit the pause button. This review of 12 studies raises more questions than answers. Docter et al. found high variability in CSA values within

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and between groups. Although the retear rate tends to be a greater when the CSA is greater than 38, clinically the groups seemed to perform about the same. The systematic review concludes that “we failed to find that [the] CSA impacted functional outcomes following RCR [rotator cuff repair] which is arguably most important to the patient.”

In an elegant biomechanical cadaveric study, Marchetti et al.¹² showed no lateral deltoid disturbance with an arthroscopic lateral acromioplasty of 5 and/or 10 mm.¹³ Clinically, Gerber et al.¹⁴ showed that in the setting of a cuff repair, a 6-mm lateral acromioplasty can be performed safely without significant risk to the deltoid origin and muscle. Their article—which was not included in the systematic review of Docter et al.¹¹ because it was a case series—did find a higher retear rate in the patients who had a larger postoperative CSA of 36° versus 34°. In addition, an interesting finding was that a higher preoperative CSA correlated with a higher retear rate.

The CSA cutoff between “small” and “large” varies among the various published articles.¹⁵⁻¹⁷ Some authors consider it to be 34°; others, 38°. Because angular accuracy is critical, we must have reproducible radiographs taken in the same AP direction that allow for interobserver and intraobserver accuracy. This is the very crux of these angular studies. Because glenoid alignment is as important as the lateral edge of the acromion, the scapula has to be positioned in a reproducible manner. Poor scapular rhythm and weak scapular muscles may affect the glenoid position. This brings us to the lateral edge of the acromion that is measured. Is it the anterior, middle, or posterior edge of the acromion? Is it the entire lateral edge from anterior to posterior?

The CSA does reopen the Pandora’s box of whether acromioplasty is necessary with rotator cuff repair. The culprit may very well be an overhanging lateral acromion. The data are suggestive that further studies are necessary to answer this question. A prospective randomized study examining patients with a similar cuff tear pattern and a CSA of 35° or greater who undergo lateral acromioplasty versus no acromioplasty to evaluate cuff retear occurrence would be a good start.

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