Is There an Association Between the “Critical Shoulder Angle” and Clinical Outcome after Rotator Cuff Repair?

Jacob Kirsch, MD, Ann Arbor, MI
Amit Nathani, MD, Ann Arbor, MI
Christopher B. Robbins, Ann Arbor, MI
Joel J. Gagnier, PhD, Ann Arbor, MI
Asheesh Bedi, MD, Ann Arbor, MI
Bruce S. Miller, MD, MS, Assoc Prof, Ann Arbor, MI

INTRODUCTION: Variations in scapular morphology have been associated with the development of atraumatic rotator cuff tears (RCT). Current theories suggest a morphologic predisposition for altered shoulder biomechanics favoring the development of RCTs. The critical shoulder angle (CSA) is a radiographic measure that accounts for both glenoid inclination and lateral extension of the acromion, and angles >35 degrees are reported to be correlated with the development of degenerative RCTs. The impact of the CSA on outcomes following rotator cuff repair (RCR) has not previously been investigated. The purpose of this study was to investigate the relationship between the CSA and clinical outcomes after rotator cuff repair.

METHODS: As part of a prospective observational cohort study we obtained CSA measurements for 144 patients with documented full-thickness RCTs who were followed up for a minimum of 48 weeks. Patients were then stratified based on RCT etiology and treatment. Demographic data as well as The Western Norway Rotator Cuff Index (WORC), American Shoulder and Elbow Surgeons (ASES) score, and Visual Analog Scale (VAS) for pain were collected at baseline, four, eight, 16, 32, and 48 weeks. The CSA for all of the patients was measured retrospectively, with all assessors being blinded to the data and we calculated interclass correlation coefficients (ICC) to measure agreement. The statistical analysis included longitudinal multilevel regression modeling to investigate the association of the CSA and the WORC, ASES, and VAS for pain.

RESULTS: Controlling for demographic and clinical characteristics, patients with CSAs less than 38 degrees reported better outcome scores over time compared to those with CSAs greater than 38 degrees (WORC: B=-106.6, p=0.025, ASES: B=4.83, p=0.0001, VAS: B=-12.99, p=0.0001). Interobserver and intraobserver reliability for CSA measurements resulted in an ICC of 0.969 and 0.982 respectively, indicating excellent agreement.

DISCUSSION AND CONCLUSION: We found that a CSA less than 38 degrees was associated with better outcomes in patients following surgical repair of atraumatic full-thickness rotator cuff tears. This is the first study to examine the relationship between the CSA and outcomes following RCR. These findings suggest that individual scapular morphology may influence both disease development and surgical outcomes of rotator cuff tears. This association warrants further investigation.