A Novel Technique to Evaluate Coracoid Impingement: An MRI Study
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INTRODUCTION:
The relationship of the coracoid to the glenoid and humerus is highly variable and is dependent on the shape of the coracoid and variations in the coracohumeral arch. Recent literature has reported the prevalence of anterosuperior rotator cuff tears and coracoids impingement. Subcoracoid impingement is being treated with coracoplasty without quantitative values of normal coracohumeral interval (CHI) and other specific measurements. The purpose of this study was to evaluate the normative values between these structures and to characterize the coracoid shape and provide parameters to evaluate coracoid impingement and associated rotator cuff tears.

METHODS:
We examined 282 consecutive MRIs in neutral rotation in a shoulder COIL from our Hospital Imaging Database after IRB approval. 22 MRI’s were excluded due to severe osteoarthritis, motion artifact, or fracture. A 3T magnet was used to obtain axial T2 and GRE, Oblique coronal T2 and PD, Oblique sagittal T2 and PD view with a slice thickness of 3mm. Standardized measurements were performed on axial, coronal, and sagittal views, including coracohumeral interval (CHI), coracoid overlap (CO), coracoid recess (CR), coracoglenoid angle (CGA), coracoglenoid interval (CGI) and acromiohumeral interval (AHI). Other variables, including coracoid shape (flat, curved or hooked) and coracoacromial ligament (CAL) thickness, were also obtained. We used SAS software to correlate the measurements and presence of a subscapularis or anterosuperior rotator cuff tears. ANOVA testing was performed to evaluate the differences between the various groups.

RESULTS:
Our demographic results demonstrated 55.4% male and 44.6% female with average age of 49.6 and 50.1 respectively. The average CHI was 10.5mm axial, 10.8mm sagittal. Curved coracoids had high CO, low CHI, and low CGA. Flat coracoids had low CO, high CHI, and high CGA. Hooked coracoids had low CO, medium CHI, and medium CGA (Fig.2). When correlating coracoacromial impingement with anterosuperior rotator cuff tears, CAL thickness was significant. Significant correlations between subscapularis and anterosuperior rotator cuff tears and CO, CHI (both axial and sagittal), AHI and CGI demonstrated P values less than 0.002, 0.000, 0.001, 0.007, and 0.041, respectively (Fig.3).

DISCUSSION:
This is the first study to characterize the shape of the coracoid on MRI and evaluate parameters to predict subcoracoid impingement. There was not a significant correlation with increasing age and the relationship between the coracoid, glenoid, and humerus. However, differences were noted comparing coracohumeral ligament thickness and its prevalence with anterior rotator cuff tears. Coracoid overlap may be used to determine whether coracoplasty is needed with the presence of an anterosuperior rotator cuff tear. When evaluating the morphology of the coracoids, curved are much more likely to have an anterosuperior rotator cuff tear, while flat coracoids are less likely to have a rotator cuff tear according to our findings. This study can help guide surgery for anterosuperior rotator cuff tears and subcoracoid impingement.

Figure 1. (A) Axial MRI of patient with anterior shoulder impingement associated with rotator cuff tear and markedly decreased CHI (Arrow). (B) Measurements of coracohumeral interval (CHI), coracoid overlap (CO), and coracoglenoid interval (CGI) on Axial MRI of the shoulder.

Figure 2. Graph of quantitative measurements in relation to qualitative shape of coracoid. CR = coracoid recess, CO = coracoid overlap, CHI = coracohumeral interval, CGI = coracoglenoid interval, CAL = coracohumeral thickness and AHI = acromiohumeral interval.

Figure 3. Graph of quantitative measurements correlated with rotator cuff tears. ASCT = Anterior Superior Rotator Cuff tear SUPRA = Supraspinatus Tear. Significant values are shown by asterisk.

SIGNIFICANCE:
This is the first study to characterize the shape of the coracoid on MRI and evaluate parameters to predict subcoracoid impingement.

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REFERENCES: