Size and Morphology of the Coracoid and Glenoid in Pediatric and Adolescent Patients: Implications for Latarjet Procedure

Samuel L Posey, Matthew Ryan Boylan, Josef Jolissaint[1], Daniel Hurwit, Julian Joseph Sonnenfeld, Ziqing Yu, Susan Marie Odum[2], Jonathan Charles Riboh
[1]Orthocarolina/Cmc, [2]Atrium Health Musculoskeletal Institute

INTRODUCTION:

Anterior shoulder instability is a challenging problem in the adolescent population, with high rates of return to at-risk activities and ensuing high recurrence rates with traditional arthroscopic stabilization techniques. As a result, there is growing interest in the Latarjet procedure in this population. However, little is known about coracoid size and morphology in the growing athlete, and how this could affect their suitability for Latarjet coracoid transfer. The purpose of this study was to establish normative data on coracoid and glenoid size and morphology among a large cohort of adolescent patients and describe the anatomic relationships with demographic factors.

METHODS:

This is a retrospective cross-sectional study of a consecutive series of 584 patients aged 12 to 21 years that received a chest computer tomography (CT) scan for non-shoulder related trauma at a single level I trauma center. Demographic characteristics including patient age, sex, race, height, and BMI were sourced from the electronic medical record and the following coracoid anatomic measurements were obtained from CT scans: coracoid length, coracoid thickness, coracoid width, glenoid height, and glenoid width. The ratio of coracoid thickness to glenoid width was calculated to estimate the percent bone loss that could be addressed with a traditional Latarjet coracoid transfer. To ensure reliability among three reviewers, all measured the same 25 scans and inter-rater reliability was excellent with all Kappa coefficients >.81. Subsequently, the remaining scans were divided equally and assessed separately by these reviewers. Correlation coefficients were used to quantify the relationships between all anatomic measures and the age, weight, and height of individuals. Growth curves for each measurement were modeled using quantile regression with height and height*height as predictors. Additionally, we stratified the growth curves by sex, when significant. Of the 584 subjects, 55% were male, and average age was 19 years (Range 12, 24).

RESULTS:

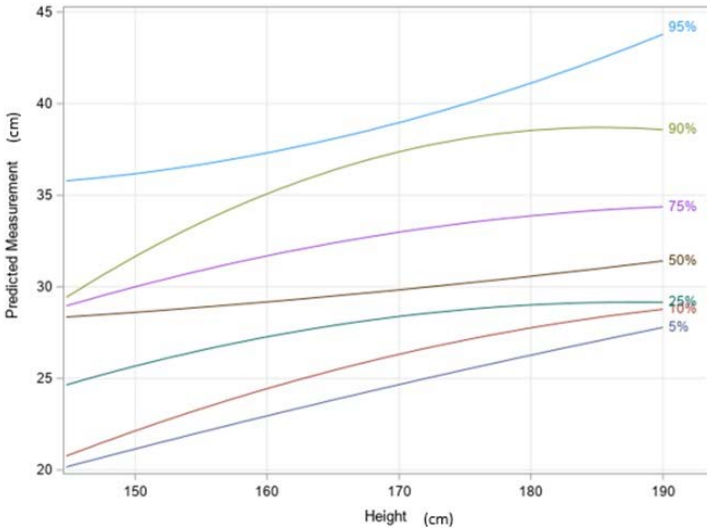
All growth curves illustrated increase anatomic size across the height range of 145 cm to 190 cm. The growth curve including all patients (Figure 1) illustrated that the 50% percentile of median coracoid length increased from approximately 28 - 32 mm. In addition to height, sex was a significant predictor for coracoid width and glenoid width. The median coracoid width increased from approximately 9.5- 10.2 mm for females compared to an increased width from approximately 10-11 cm for males. The median glenoid width for females increased from approximately 21 - 25 mm and for males the median glenoid width increased from just under 22 - 25.5 mm.

DISCUSSION AND CONCLUSION:

While the exact location of the coracoclavicular ligaments could not be assessed in this study, based on prior anatomic studies[1] the expected usable coracoid length in our cohort was greater than 20 mm in 90% of patients taller than 145 cm. Interestingly, the coracoid thickness to glenoid width ratio was stable throughout adolescence, suggesting that typical amounts of glenoid bone loss can be addressed with a traditional Latarjet throughout this age group. In patients shorter than 145 cm, consideration should be given to fixation strategies other than the traditional two parallel screws given the predicted usable coracoid length of less than 20 mm.

References:

1. Chahla J, Marchetti DC, Moatshe G, et al. Quantitative Assessment of the Coracoacromial and the Coracoclavicular Ligaments With 3-Dimensional Mapping of the Coracoid Process Anatomy: A Cadaveric Study of Surgically Relevant Structures. *Arthroscopy*. 2018;34(5):1403-1411. doi:10.1016/J.ARTHRO.2017.11.033


45
40
35
30
25
20
Predicted Measurement (cm)
150
160
170
180
190
Height (cm)
95%
90%
75%
50%
25%
10%
5%