Anatomic and Biomechanical Comparison of the Classic and Congruent-Arc Techniques of the Latarjet Procedure

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Objectives: The Latarjet procedure is commonly performed using either the classic (standing) or the congruent-arc (lying) technique. There are potential clinical advantages and disadvantages of each technique. However, the anatomic and biomechanical effects, benefits, and limitations of each technique are unknown. The purpose of this study was to compare the anatomy and biomechanical strength of fixation between the two techniques.

Methods: A biomechanical cadaver study was performed with 20 pairs of male and female shoulders (n=40). One of each pair of shoulders was randomly assigned to receive the classic or congruent-arc technique. Coracoid and glenoid anatomic measurements were collected prior to biomechanical testing. A pull force was applied through the conjoined tendon to replicate forces experienced by the coracoid graft in the early post-operative period, and the failure load was determined for each specimen (Figure 1).

Results: The mean surface area available for fixation in the classic technique was 263.3 mm² compared to 177.0 mm² in the congruent-arc group (p<0.001). In the classic group, 36% of the glenoid width was re-created, and 50% was re-created in the congruent-arc group (p<0.001). The congruent-arc technique resulted in a significantly lower (p=0.005) mean failure load (238.9 ± 91.2 N) compared to the classic technique (303.0 ± 114 N). Failure load was significantly higher in males (p=0.037); male specimens had a mean failure load of 343.9 ± 122.2 N for the classic technique and 289.4 ± 73.0 N for the congruent-arc technique, and females had a mean failure load of 266.1 ± 97.7 and 193.5 ± 84.0 N, respectively (Figure 2).

Conclusion: In this biomechanical model, the classic technique of the Latarjet procedure provided a greater surface area for healing to the glenoid and greater biomechanical strength of fixation when compared to the congruent-arc technique. The congruent-arc technique allowed restoration of a larger glenoid defect.

Figure 1. A-B) Failure of classic technique specimen. C-E) Failure of congruent-arc specimen with gross motion (C-D) occurring before complete failure. To address the primary hypothesis of this study, the strength of each Latarjet technique was assessed while accounting for the size and density of individual coracoid specimens. Mixed-effects ANOVA models were built to assess the effect of Latarjet technique (repeated measures on paired specimens) on failure load and load-to-first motion, adjusted for gender. An a priori power analysis indicated that 20 specimen pairs would be sufficient to detect an effect size of $f=0.33$ with 80% power.

Figure 2. Failure load and load-to-first motion means and standard deviations by technique and gender.