The Effects of Latarjet Reconstruction on Glenohumeral Instability in the Presence of Combined Bony Defects

Piyush Walia, Master of Sciences¹, Ronak Patel, MD², Lionel Gottschalk, MD³, Matthew Kuklis, MS¹, Morgan Jones, MD, MPH¹, Stephen Fening, Ph.D³, Anthony Miniaci, MD, FRCSC¹.
¹Cleveland Clinic, Cleveland, OH, USA, ²Illinois Bone and Joint Institute, Morton Grove, IL, USA, ³Austen BioInnovation Institute, Summa health system, Akron, OH, USA.

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Introduction: Recurrent glenohumeral instability is often as a result of underlying bony defects in the glenoid and/or humeral head. Anterior glenoid augmentation with a bone block (i.e. Latarjet) has been recommended for glenoid bone loss in the face of recurrent instability. However, no study has investigated the effect of Latarjet augmentation in the setting of both glenoid and humeral head defects (Hill-Sachs Defects (HSD)). The purpose of this study was to evaluate the stability achieved through a Latarjet procedure in the presence of combined bony defects.

Methods: Eighteen fresh-frozen cadaveric specimens were tested at all combinations of glenohumeral abduction (ABD) angles of 20°, 40°, and 60° and three external rotation (ER) levels (0°, 40°, and 80°). Each experiment comprised of anterior dislocation by translating the glenoid under a 50N medial load applied on the humerus, simulating the static load of soft tissues. Translational distance and medial-lateral displacement of the humeral head, along with horizontal reaction forces were recorded for every trial. Specimens were tested in an intact condition (no defect), different combinations of defects, and with Latarjet augmentation. The Latarjet was performed for 20% and 30% glenoid defects by transferring the specimen’s coracoid process anterior to the glenoid flush with the articulating surface. Four different humeral head defects were created of sizes 6%, 19%, 31%, and 44% of humeral diameter. Repeated measures analysis of variance (ANOVA) was performed with statistical significance set at p <0.05.

Results: Results are summarized in Fig. 1. The vertical axis represents the normalized distance to dislocation with respect to the values of the intact joint. The horizontal axis represents the varying sizes and combinations of bony defects. At 20° ABD and 0°ER, increasing HSD size did not affect percentage of intact translation with a constant glenoid defect of 20% before and after Latarjet augmentation (Fig. 1A). However, at an arm position of 60° ABD and 80° ER increasing HSD size led to a decrease in stability for both the defect state and post-Latarjet trials (Fig. 1B). Nevertheless, Latarjet augmentation helped in regaining stability for every combination of bony defects. With a HSD size of 44% the defect state had 0% intact translation for all 18 specimens.

Discussion: Clinically, these results demonstrate that some degree of stability can be regained for combined bony Bankart and Hill-Sachs defects with a Latarjet procedure. However, for humeral defects larger than 30%, the rotational effect of the HSD led to persistent instability. Thus, directly addressing the humeral defect to restore the articular surface should be considered in these cases.
Significance: This study demonstrated that Latarjet procedure can restore the stability for combined defects, however for humeral defects greater than 31% may need attention.

A. 20ABD - 0ER

![Graph A]

B. 60ABD - 80ER

![Graph B]

Figure 1: Percent intact translation for the listed defect state with and without Latarjet augmentation for a 20% glenoid defect combined with HSD sizes of 0, 6, 19, 31, and 44% at arm positions of (A) 20° ABD and 0° ER and (B) 60° ABD and 80° ER, where * signifies the significant difference between the defect state and Latarjet repair for each defect combination and † signifies the significant effect of increasing defect size with p <0.05.

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