

SHOULD ACUTE ANTERIOR DISLOCATION OF THE SHOULDER BE TREATED IN EXTERNAL ROTATION

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INTRODUCTION

Acute anterior dislocation of the shoulder is associated with a Bankart lesion in up to 97% of young patients. Traditionally, these patients are managed in a sling with the arm in adduction and internal rotation. The recurrence rate for dislocation is extremely high and reflects a lack of proper healing at the tissue-bone interface. The anteroinferior stabilising structures of the shoulder are relaxed when the arm is positioned in adduction and internal rotation may position. This may allow medial displacement of the detached glenoid labrum and account, in part, for the high recurrence rate. Itoi and co-workers recently used magnetic resonance image (MRI) to assess the position of the Bankart lesion with the arm in internal and external rotation, in patients that had had a dislocation (1). This study demonstrated suggested that immobilization of the arm in external rotation better approximates the Bankart lesion to the glenoid neck compared to the traditional position of internal rotation. The position of the tissues following an acute dislocation may play an important role in the "stability" achieved following healing. This study assessed the effect of external rotation of the humerus on the position and contact force of a Bankart lesion created in a human cadaveric shoulder model.

METHODS

Ten human cadaveric shoulder girdles were used in this study (age range 45-60 years old). The specimens were stripped of deltoid to allow easier access to the rotator cuff musculature and the gleno-humeral joint and fixed through the medial border of the scapula to testing jig. The medial border of the scapula was held vertically and the gleno-humeral articulation held in neutral abduction (50° abduction relative to the lateral border of the scapula). The intertubercular groove was positioned anteriorly and a pin inserted perpendicularly into the anterior cortex of the humerus. A goniometer was fixed to the stand below the pin to allow accurate of humeral rotation. A rod was inserted retrograde into the humeral shaft and fixed to a mechanical rotation device to control rotation. A six-degree-of-freedom tracking device (Polhemus, Burlington, VT) was attached to the humeral head to record any translations or rotations of the humerus during rotation. The glenohumeral joint was arthroscopied and a Bankart lesion extending from 3 o'clock to 6 o'clock created with a curved periosteal elevator. All irrigation fluid was removed from the joint. A force sensor (0.12 mm, load range 0-111N, Flexiforce, TekScan, South Boston, MA) was passed beneath subscapularis and placed between the detached labrum and the anterior margin of the glenoid rim. The contact force between the glenoid labrum and the glenoid was measured in 60° of internal rotation, neutral rotation and 45° of external rotation and held for 20 seconds with a 22 N joint compressive load (2). The measurements were repeated three times in each position and a mean contact force calculated for each position of rotation. Data was analysed using a 2 way analysis of variance followed by a Tukey Honest Significant Difference post-hoc test using Statistica (Statsoft, Tulsa, OK).

RESULTS

The 3D tracking device revealed no anteroposterior humeral translation during the rotation movement of the humerus. No contact force was measurable with the arm in internal rotation. The contact force increased as the arm passed through neutral and reach a maximum at 45 degrees of external rotation. Figure 1 presents a typical load versus time output from one of the specimens as the shoulder was rotated through neutral to 45 degrees of external rotation and held for 20 seconds. The contact force returned to 0 when the arm was returned to neutral. The mean contact force at 45 degrees external rotation was 83.5 g (sd 37.7 g).

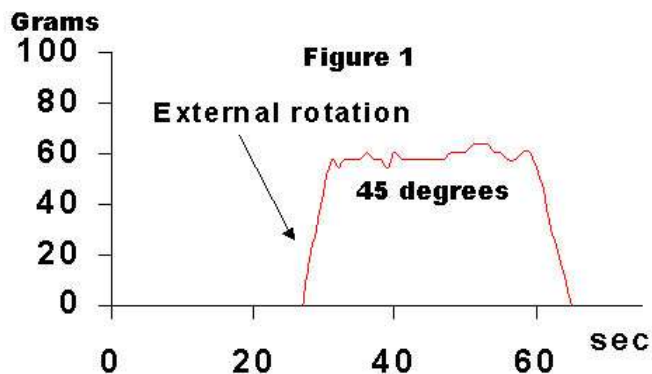


Figure 1: The contact force between the glenoid labrum and the glenoid increased as the arm passed through neutral and reached a maximum at 45°.

DISCUSSION

Acute anterior dislocation of the shoulder in young patients is associated with redislocation rates approaching 90%. The results of this cadaveric study support the hypothesis of Itoi (1) that the tight anterior soft tissue structures with the arm in external rotation would help a Bankart lesion to heal due to apposition of the tissues. Itoi reported that upon external rotation the detached area of the capsule, opening angle and detached length were significantly (1). The effect of external rotation was also tested in vivo with MRI/ CT arthrograms in 2 patients known to have large labral tears. The displacement of the labral tear was seen to reduce in external rotation similar to that reported by Itoi and co-workers (1).

Placing the arm into external rotation resulted in a significant increase in contact force between the glenoid labrum and the glenoid. The role of this force in tissue-bone healing and recurrence rate of anterior dislocation remains to be determined. Initial management with the arm in an external rotation brace may reduce this high redislocation rate.

1. Itoi E. et al., JBJS 83(5):661-669, 2001.
2. Speer K. et al., JBJS 76(12) 1819-1826, 1994.