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Paper #97

Glenoid Retroversion Is an Important Factor for Humeral Head Centration and the Biomechanics of Posterior Shoulder Stability

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Summary:
In combination with glenoid retroversion, isolated labrum repair has only little effect on posterior stability.

Abstract:

Background

Glenoid retroversion is a known independent risk factor for recurrent posterior instability.

Purpose

The purpose of this study was to investigate different angles of glenoid retroversion and their influence on posterior humeral translation with intact, detached and repaired posterior labrum in a cadaveric human shoulder model. Study Design: Controlled laboratory study

Methods

A total of 12 fresh-frozen human cadaveric shoulders were investigated for this study. After CT-scanning, the glenoids were aligned parallel to the floor, with the capsule intact and the humerus was fixed in 60° of abduction and neutral rotation. Version of the glenoid was created after wedge resection from posterior and fixed with an external fixator throughout the testing. Specimens underwent three conditions: intact, detached and repaired posterior labrum, while version of the glenoid was set from +5° anteversion to -25° retroversion by 5° increments. Within the biomechanical setup, the gleno-humeral joint was axially loaded (22 N) to center the joint. At 0° of glenoid version and intact labrum, the initial position was used as baseline and served as point zero of centerization. After cyclic preloading, posterior translation force (20 N) was then applied by a material testing machine, while start and endpoint of the scapula placed on a X-Y-table was measured with Microscribe.

Results

The decenterization of the humeral head at glenoid version angles of 5°, 10°, 15°, and 20° of retroversion and 5° of anteversion was significantly different ($p<0.001$). Every increment of 5° of retroversion led to an additional de-centerization of the humeral head overall by (average ±SD) 2.04 mm ±0.31 in the intact, 2.04 mm ±0.72 in the detached labrum, and 2.57 mm ±0.28 in the repaired condi-tion. The repaired showed significantly lower posterior translation compared to the intact condition at 10° ($p=0.012$) and 15° ($p<0.01$) of retroversion. Additionally, CT

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measured parameters (depth, diameter, native version) of the glenoid showed no correlation with angle of dislocation of each specimen.

Conclusions

Bony alignment in terms of glenoid retroversion angle plays an important role in joint centration and posterior translation. In combination with glenoid retroversion, isolated labrum repair has only little effect on posterior stability.