

Realignment Osteotomies of the Acromion and the Glenoid for the Treatment of Recurrent Posterior Shoulder Instability: A Preliminary Report of 9 Cases

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INTRODUCTION:

Redundant posterior capsule, posterior labral lesions, increased glenoid retroversion, posterior glenoid bone loss, and loss of muscle coordination have all been considered reasons for posterior shoulder instability without satisfactorily explaining its presence or its absence. Recent radiographic and 3D computertomographic studies documented that as well recurrent as static posterior shoulder instability are consistently associated with a high, horizontal acromion resulting in decreased posterior coverage of the humeral head and often, a variably inferiorly inclined (and retroverted) glenoid. In an in-vitro biomechanical model, correction of posterior instability in 3D models of unstable shoulders, restoration of stability was only but consistently possible if acromial and glenoid anatomy were corrected to normal as defined with a statistical mean shape model.

After thorough anatomical and radiological studies, confirmatory biomechanical in-vitro tests, it was the purpose of this study to restore normal scapular anatomy with the goal to correct recurrent dynamic posterior shoulder subluxation and improve concentricity in static posterior subluxation. It was the hypothesis that the correction of scapular anatomy could restore shoulder stability and reduce early static posterior subluxation if present preoperatively.

METHODS:

Nine patients with either static (as defined with a glenohumeral subluxation index >55%) (n=1)), recurrent dynamic (n=5) or combined posterior shoulder instability (n=3) were entered. A CT scan of the affected shoulder was segmented and compared with the anatomy of a statistical mean shape model created from 40 normal shoulders. Corrective osteotomies of the acromion and the glenoid were 3D planned, and personalized cutting and reduction jigs were planned and manufactured to allow transformation of scapular anatomy so as to create a normal glenoid-acromion relationship. After informed consent, the patients were operated under general anesthesia and followed up clinically and with imaging (Conventional X-ray plus CT) at 6, 12, and 18 or 24 months.

RESULTS:

Eight men and 1 woman with a median age of 36 (23-47) years were enrolled. There were 5 purely dynamic (4/5 revision cases), 3 dynamic and static subluxations (2 revision cases), and one purely static subluxation. Six patients had 1 to 3 failed previous stabilization procedures. The clinical data are presented in Table 1.

	median (n=9)	preop	median at up	19 m f-
Subjective Shoulder Value (%;range)	30 (20-75)		70 (10-100)	
Age and Gender Adjusted Constant Score %	38 (32-91)		80 (19-100)	
Subjective Shoulder instability	8/9		0/9	
Pain (15 points = painfree; 0 = worst possible pain)	6 (3-13)		14 (2-15)	
Excellent / good / fair / poor	0 / 0 / 3 / 6		6 / 0 / 1 / 2	
Median scapulohumeral subluxation Index	70% (75-57%)		58% (73-50%)	
Median glenohumeral subluxation index (normal 45-55%) (s.i.)	50% (75-50)		50%(75-50%)	
Eccentric Shoulders (glenohumeral subluxation index >55%)	4		2	
Improvement of subluxation (better, same, worse)			4 /4/1	

There was one technical complication with failure to achieve the planned correction. This patient represented one of two failures: In the second (workmans' comp) failed case, the shoulder is recentered, passively freely mobile, without neurological complications and unexplained loss of active range of motion and pain.

DISCUSSION AND CONCLUSION:

Acromial and glenoid position and orientation have never been considered as a cause of posterior shoulder subluxation. This preliminary report documents correction of dynamic instability at a median follow up of 19 months in 8 of 8 unstable patients, progressive static posterior subluxation in a failed correction, maintenance of concentricity (s.i. 45-55%) in 4, and marked improvement of static concentricity in 4 shoulders. The precision of the realization of the planned corrections needs further improvement. The early results of precisely executed SCOPE (scapular corrective osteotomies for posterior escape) osteotomies lend support to the hypothesis that the documented, specific anatomic anomalies of posterior escape are (co-)responsible for posterior shoulder instability and open a new pathway to treat dynamic and potentially prevent or even revert static posterior glenohumeral subluxation.