

A 4-portal arthroscopic stabilization in posterior shoulder instability

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The purpose of this study was to present an arthroscopic stabilization technique with 4 portals for posterior instability used in 11 patients (13 shoulders). There were 7 male and 4 female patients. All patients had an arthroscopic labral suture with anchors and capsular plication with 4 portals. The follow-up period averaged 34 months. No complication or recurrence of instability was noted. A moderate loss of range of motion was noted in 4 shoulders and moderate pain in 2 shoulders. All patients were satisfied. According to the literature, the rate of recurrence of instability is currently lower than 12% when a labral suture and capsular plication are performed. Our results for pain and range of motion are similar to those described in recent publications. However, we think that the 4-portal technique allows a facilitated access to the postero-inferior part of the glenoid and reduces the rate of postoperative instability. (J Shoulder Elbow Surg 2003;12:337-41.)

Posterior shoulder instability is present in only about 2% of total recurrent shoulder instability cases. As with anterior instability, it may be divided into 3 groups: recurrent posterior dislocation, recurrent posterior subluxation, and painful shoulder in a position of posterior instability (ie, a forward-flexed, adducted, and internally rotated position). Descriptions of many functional and surgical treatments have been published, but the place of arthroscopic treatment is gaining importance in this pathologic condition. The purpose of this study was to assess the results of arthroscopic stabilization with plication and a labral

suture anchor by use of a 4-portal technique in 11 patients.

MATERIALS AND METHODS

Eleven patients (thirteen shoulders) underwent posterior arthroscopic capsular plication with suture anchors between 1994 and 1998. The mean age was 33 years (range, 18-47 years). There were 7 male and 4 female patients. One patient had undergone previous open surgery for anterior instability on the affected shoulder. The dominant arm was involved in 9 patients.

Nine patients were athletes (basketball, 1 patient; weightlifting, 1 patient; biking, 1 patient; kickboxing, 2 patients; tennis, 2 patients; gymnastics, 1 patient; and riding, 1 patient), two of whom were professional athletes (basketball and gymnastics). Bilateral lesions were present in 1 male tennis player and 1 female practicing riding.

Of the 13 shoulders, 3 had posterior dislocations, 2 had posterior dislocations and subluxations, 3 had isolated posterior subluxations, and 5 were painful without any dislocation or subluxation. However, in these 5 cases, pain was reproduced in a position of posterior instability (ie, a forward-flexed, adducted, and internally rotated position). Six shoulders were limited in lateral elevation and internal rotation. Two patients (three shoulders) had generalized ligamentous laxity.

Standard radiographs and computed tomography arthrograms were obtained in all shoulders. The standard radiographic results showed 1 fracture of the posterior margin of the glenoid, 1 anterior lesion of the humeral head (<20% of the humeral cartilage surface), and no glenohumeral osteoarthritis. The computed tomography arthrograms showed a posterior erosion of the glenoid in 10 shoulders (Figure 1), a posterior erosion of the glenoid associated with a posterior Bankart lesion in 2 shoulders, and an anterior and posterior Bankart lesion in 1 shoulder. There were no glenoid or humeral head version problems. All painful shoulders in internal rotation, adduction, and forward elevation had a posterior lesion of the glenoid.

Technique

Patients were placed in the lateral decubitus position with the involved extremity positioned in 30° abduction and 30° forward flexion. Traction was applied distally and vertically to distract the humeral head away from the glenoid.

The first portal was the standard posterior portal; it was used for the outflow cannula. The second portal was an

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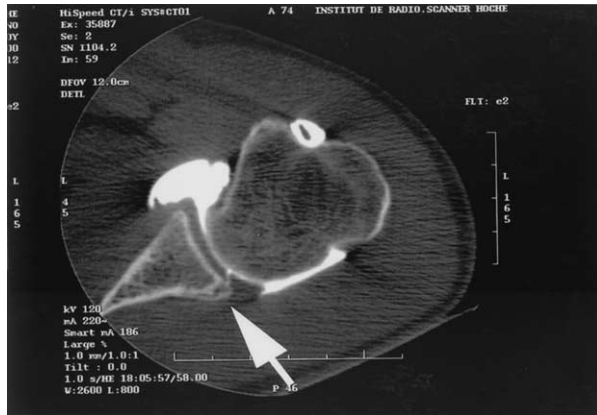


Figure 1 Posterior margin lesion of the glenoid on computed tomography scan.

anterior portal over the biceps tendon (anterosuperior portal). The position over the biceps tendon allowed visualization of the posterior and anterior-inferior parts of the glenoid. The third was an instrumental portal through the rotator interval performed by an inside-out approach (anterior portal) in order to repair anterior extension of posterior lesions. The fourth portal was an instrumental posterolateral portal created 1.5 cm lateral to the external part of the acromion at the third posterior section¹⁰ (Figure 2, A). This portal allowed access to the posterior and inferior quadrant of the glenoid with instruments (Figure 2, B).

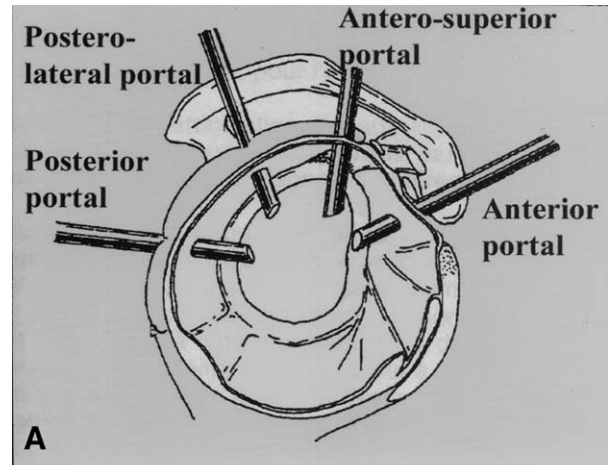
In all patients, a complete assessment of the glenoid, humeral head, labrum, capsule, and ligament was performed. The scope was placed through the anterior and superior portal. The posterolateral portal was then used to reach the detached labrum (Figure 3). Drill holes were made on the posterior margin of the glenoid in the area of labrum detachment (Figure 4). Glenoid abrasion with a shaver or an arthroscopic rasp was performed until a bleeding bony surface was present (Figure 4).

A suture hook, introduced via the posterolateral portal, was passed through the capsule to perform the plication and a PDS suture was then passed through the suture hook (Figure 5). In patients with hyperlaxity, plication was performed far from the labrum to increase capsular tension.

The suture was retrieved with a suture grasper. The PDS suture was then placed on the GII Mitek anchor, and the anchor was inserted into a drill hole (Figure 6). The arm was placed in neutral rotation, and a slipknot was made outside the cannula and slid down into the joint with a knot pusher (Figure 7). Two or three anchors were used to repair the posterior capsular and labrum detachment. If an anterior Bankart lesion was associated with the posterior lesion, an anterior reconstruction was performed with the same suture and capsular plication technique through the anterior portal (with 1 or 2 anchors depending on the lesion extension). At the end of the procedure, the suture resistance was assessed with a palpator.

RESULTS

The diagnosis of posterior shoulder instability was confirmed by an examination with the patient under



A



B

Figure 2 A, Different portals used in the 4-portal technique: posterior portal, posterolateral portal, anterosuperior portal, and anterior portal. **B**, Bony landmarks of the posterolateral portal (X).

anesthesia. The scapula was stabilized, and posterior translation was applied on the humeral head. In all shoulders the head of the humerus was felt beyond the posterior margin of the glenoid. This translation was always greater in the posterior direction than in the anterior or inferior direction. In 2 cases posterior laxity was present on the contralateral shoulder.

A posterior Bankart lesion with capsular and labral detachment from the glenoid was confirmed in all shoulders (Figure 3). An anterior and inferior glenoid labrum and capsular detachment were present in 2 shoulders. The humeral head chondral surface was normal in 11 shoulders and had an anterior lesion in 2 shoulders (<20% of the humeral cartilage surface). Two glenoids had cartilage lesions in the posterior third of the chondral surface.

The mean follow-up period was 34 months (range, 11-80 months). Eleven shoulders were pain-free and two were painful with moderate activity. No shoulder had recurrent posterior instability.

Range of motion was normal in 9 shoulders. One

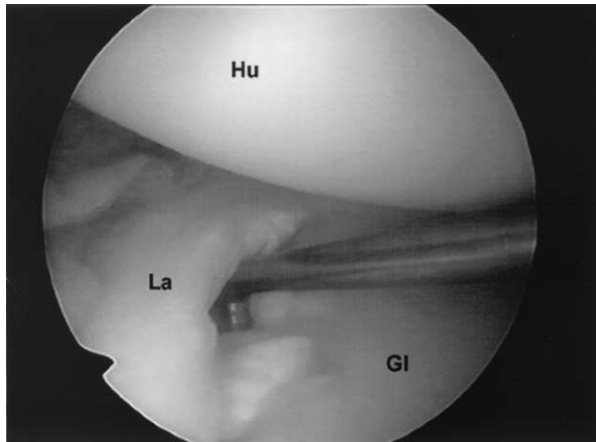


Figure 3 Posterior detachment of the labrum (the scope is introduced in the anterior and superior portal and the palpator in the posterolateral portal). *Hu*, Humeral head; *Gl*, glenoid; *La*, labrum.

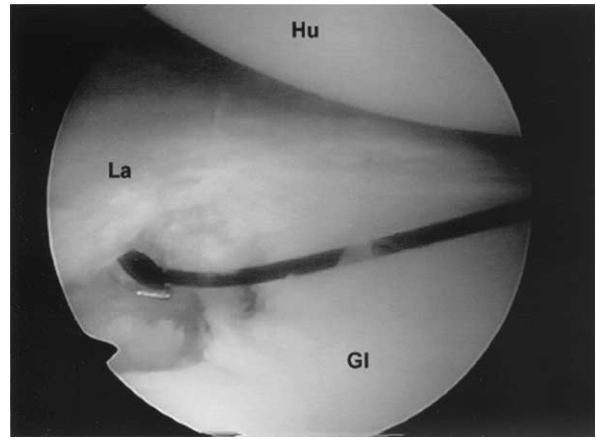


Figure 5 Plication with the suture hook passed through the capsule (the scope is introduced in the anterior and superior portal and the hook in the posterolateral portal). The PDS suture is passed through the suture hook. *Hu*, Humeral head; *Gl*, glenoid; *La*, labrum.

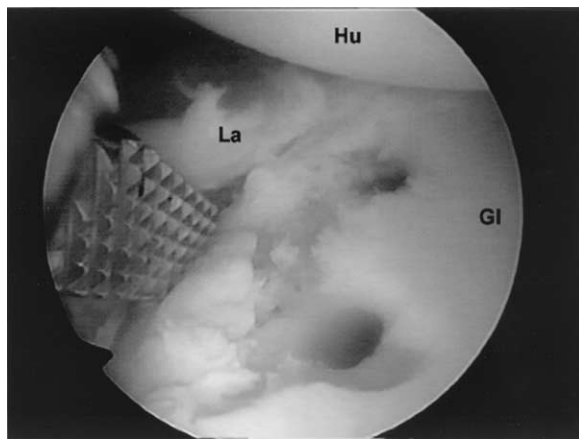


Figure 4 Glenoid abrasion with the rasp to obtain a bleeding bony surface. Two drill holes are made before abrasion (the scope is introduced in the anterior and superior portal and the rasp through the posterolateral portal). *Hu*, Humeral head; *Gl*, glenoid; *La*, labrum.

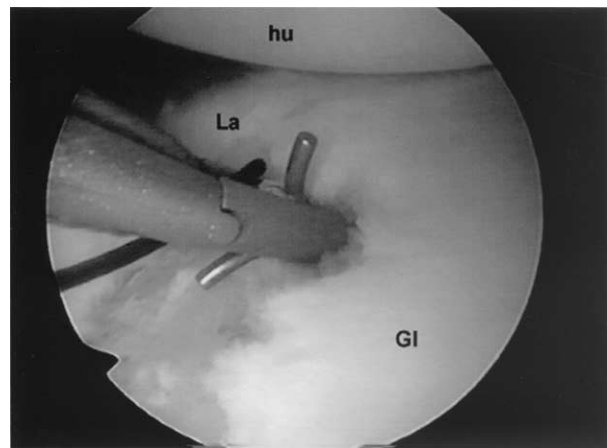


Figure 6 A Mitek anchor (with PDS suture) is placed into the drill hole (the scope is introduced in the anterior and superior portal and the instrument in the posterolateral portal). *hu*, Humeral head; *Gl*, glenoid; *La*, labrum.

shoulder lost 10° of abduction and had limited internal rotation (3 vertebrae), two shoulders lost 10° and 20° of abduction, and one shoulder had limited internal rotation (3 vertebrae). External rotation and forward elevation were normal in all shoulders.

Eight athletes claimed to have returned to their preinjury level, and all patients were satisfied or very satisfied with the result of the operation.

On the basis of the outcome scale described by Wolf and Eakin,²⁷ the results were excellent or good, with a mean postoperative score of 22.3 out of a possible 24 (range, 18-24).

No anchor migration was noted on standard radiographs. Glenohumeral joint osteoarthritis (type I in the classification of Samilson and Pietro¹⁸) appeared

in 2 shoulders that presented glenoid cartilage lesions without any symptoms.

DISCUSSION

Many surgical procedures have been described to treat posterior instability. These have included biceps or deltoid transfers,^{4,13} posterior capsular shifts,^{6,17,21,26} glenoid osteotomies,^{2,5,8,12,19} humeral osteotomies,²⁰ and posterior bone block.^{1,15} According to the different studies, the results were not uniform, and the complications were significant. Arthroscopic techniques for posterior instability are more recent, and the results seem to be promising. A labral suture and capsular plication are used by many

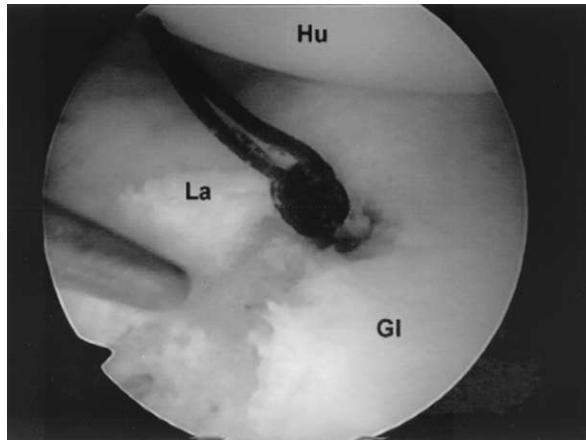


Figure 7 The inferior part of the posterior lesion is repaired with the first knot. A second knot is necessary to obtain correct suturing of the entire posterior labrum. *Hu*, Humeral head; *Gl*, glenoid; *La*, labrum.

authors.^{22,27} However, different approaches have been used to perform posterior stabilization.

Wolf and Eakin²⁷ reported a technique of capsular plication and labral suture with anchors in 14 patients, with a minimal follow-up period of 2 years. With this technique, 3 portals were used: a standard posterior approach, an anterior portal through the rotator interval, and a posterior and distal portal (3 cm distal to the posterolateral corner of the acromion) to perform the 6-o'clock suture. Only 1 patient had a recurrence of posterior subluxation after trauma to the shoulder. He underwent the same procedure and did not have any recurrence of instability after a follow-up period of 2 years. Eleven patients returned to their preinjury level of activity.

Treacy et al²² treated a group of 25 patients with multidirectional instability with a capsular suture and plication. A standard posterior portal and an anterior portal were used. Sutures were placed up to the 7-o'clock position with the anterior portal. Fourteen patients had anterior and posterior Bankart lesions, and eleven had posterior and inferior injury of the labrum. The mean follow-up period averaged 60 months. Two patients had traumatic recurrent instability, and one patient had subluxations during daily activities.

These studies demonstrate the significant success of arthroscopic treatment for posterior shoulder instability. Capsular plication seems to be important to reduce the volume of the glenohumeral joint.²⁷ In addition, abrasion of the glenoid and suture of the labrum allow for increased healing.^{22,27} However, common portals do not allow accessibility to the posterior and inferior quadrant of the glenoid. We think that a posterior and lateral portal is important to reach the posterior labrum avulsion and to obtain a strong

suture. In addition, an anterior portal over the biceps tendon allows a vertical view of the inferior part of the glenoid (anterior and posterior) and permits visualization of the repair of an anterior extension of posterior lesions.

Although a 6-o'clock suture is important for posterior stability, it probably reduces the range of motion in lateral elevation in cases of posterior and inferior capsular plication. Wolf and Eakin²⁷ noted 3 patients with a moderate loss of range of motion and 1 with mild loss. We also noted 3 shoulders with a moderate loss of motion in lateral elevation. Treacy et al²² noted a full and symmetrical range of motion in all patients except one (limited to 160°). However, there were no sutures beyond the 7-o'clock position.

Capsular plication in the 6- or 7-o'clock position does not present any risks. Eakin et al,⁷ in an anatomic study, showed that the mean distance to the axillary nerve in inferior and posteroinferior suture positions was 14.4 mm and 24.1 mm, respectively. Moreover, no reports of complications such as vascular or nerve injury have been published in any arthroscopy series.^{22,27} We noted osteoarthritis radiographically in 2 shoulders with lesions in the posterior third part of the glenoid found at arthroscopy. The patients had a long history of posterior instability responsible for cartilage injuries. However, capsular plication may increase intraarticular pressure and accelerate the development of osteoarthritis if cartilage lesions are already present, as in our 2 patients.

A 4-portal technique is necessary to reach the posterior part of the glenoid and to treat the anterior extension of the posterior labral lesions. This technique has no anatomic risks and allows improvement in arthroscopic stabilization for posterior shoulder instability. However, it does not prevent the occurrence of osteoarthritis if cartilage lesions are visible at arthroscopy. In addition, in patients without hyperlaxity, moderate pain and loss of range of motion may occur if capsular plication is excessive.

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