

Primary Repair Versus Conservative Treatment of First-Time Traumatic Anterior Dislocation of the Shoulder: A Randomized Study With 10-Year Follow-up

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Purpose: The purpose of this study was to compare long-term results after surgical and conservative primary treatment of first-time traumatic anterior shoulder dislocation. **Methods:** Arthroscopic diagnosis after first-time traumatic anterior shoulder dislocation was performed, and in cases of a Baker type 1, 2, or 3 lesion, patients were randomized either to conservative treatment with a fixed sling for 1 week followed by a rehabilitation program or to open repair with a similar rehabilitation program. **Results:** In this study 76 patients (14 female and 62 male patients), aged 15 to 39 years, were randomized to surgical repair (n = 37) or conservative treatment (n = 39). Of the patients, 6.6% had Baker type 1 lesions, 13.2% had type 2 lesions, and 80.3% had type 3 lesions. After a minimum of 2 years' follow-up, 56% had recurrence after conservative treatment and 3% after open repair ($P < .005$). Among nondislocators, 39% in the conservative group and 7% in the repair group had a positive apprehension test. When evaluated after 10 years by use of the Oxford self-assessment score, 72% of patients in the surgical group had good or excellent results. Of the conservatively treated patients, 75% had unsatisfactory results because of recurrence, instability, and pain or stiffness. **Conclusions:** Arthroscopic evaluation after first-time anterior shoulder dislocation revealed a Baker type 2 or 3 lesion in 93.5% of patients. At 2 years' follow-up, 21 (54%) of the conservatively treated patients had recurrence, as compared with 1 patient with recurrence (3%) after open surgical repair. After 8 years, a further 3 patients in the conservatively treated group had redislocations, 1 had subjective instability, and 4 had pain or stiffness, resulting in 74% having unsatisfactory results according to the Oxford score. Of the patients who had surgical repair, 72% had good or excellent results after 10 years. Because open repair produces superior results compared with conservative treatment, we recommend that the surgeon consider performing primary repair in active patients to reduce the risk of recurrence. **Level of Evidence:** Level I, high-quality prospective, randomized controlled trial. **Key Words:** Primary treatment—Shoulder dislocation—Arthroscopy—Open surgery.

The shoulder joint is the most frequently dislocated joint in the body.¹⁻³ In the young patient traumatic anterior dislocation is associated with a high

redislocation risk,^{1,3-5} and this risk of recurrence is associated with age at the time of trauma, primary surgical or nonsurgical treatment, and type of lesion.^{4,6-13} In 1990 Baker et al.⁶ described a classification system for the arthroscopic evaluation of the shoulder joint after shoulder dislocation usable for determining the relation between lesion and recurrence risk.

Until recently, conservative primary treatment has been advocated, including immobilization and extensive rehabilitation^{9,13-17} and even arthroscopic lavage.¹⁸ Other recent studies have advocated for immobilization of the shoulder in external rotation based on the work by Itoi et al.¹⁹ Surgical treatment has been re-

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The authors report no conflict of interest.

This study is presented on behalf of the Danish Society for Shoulder and Elbow Surgery.

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0749-8063/07/2302-5420\$32.00/0

doi:10.1016/j.arthro.2006.11.004

served for recurrent dislocations^{20,21} or in selected patients who are active in sports.²²⁻²⁴

Few prospective randomized studies comparing primary conservative and surgical treatment of anterior shoulder dislocations have been published, and none have long-term follow-up, which stresses the importance of our study.

The aim of this randomized study was to evaluate the recurrence risk after primary Bankart repair in young female and male patients who sustained an acute first-time traumatic anterior shoulder dislocation. The hypothesis was that primary repair of arthroscopically revealed lesions after first-time traumatic anterior shoulder dislocation would reduce the recurrence rate compared with conservative treatment.

METHODS

In this multicenter-designed study 85 consecutive patients who fulfilled the inclusion criteria, presenting at the emergency departments of the 13 participating hospitals, were asked to participate in the study. The inclusion criteria were age between 15 and 39 years, initial dislocation with no history of previous shoulder problems, anterior dislocation confirmed by radiography, and no fracture of the greater tubercle. The study was approved by the local ethical committee.

In all patients standard anteroposterior and lateral radiographs, as well as the West Point view,²⁵ were obtained to evaluate any glenoid fractures. Before the study was begun, all 13 experienced surgeons gathered to standardize the arthroscopic diagnostic criteria and practice in a cadaver laboratory to ensure equality in diagnosis and surgical technique.

After informed consent to randomization was obtained from 80 patients, all underwent standard arthroscopy within the first week after injury. After lesions, as previously standardized by Baker,⁴ were described through arthroscopy, the patients were randomized via a sealed-envelope technique to either open Bankart repair or nonsurgical treatment.

Surgical Treatment

Patients randomized to surgery were redressed, and the subscapularis tendon was exposed through a deltopectoral split. The capsule and tendon were cut and the Bankart lesion repaired anatomically by use of Mitek anchors (DePuy Mitek, Raynham, MA). The capsule and subscapularis tendon were closed end to end, and the shoulder was immobilized in a fixed sling for 2 days.

Nonsurgical Treatment

After randomization to conservative treatment, only arthroscopy was performed; the arthroscope was retracted from the joint, and the shoulder was immobilized in a fixed sling for 2 days.

Rehabilitation Protocol

All patients had a nonfixed sling for 1 week, after which both groups underwent an identical rehabilitation program consisting of passive movement immediately postoperatively without rotating, lifting, and pushing. At 3 weeks postoperatively, active internal rotation and abduction were permitted, and after 8 weeks, external rotation exercises were introduced. Swimming and light sports were allowed after 12 weeks and overhead sports after 6 months.

During the study period, any recurrent dislocation was recorded and follow-up treatment registered.

At follow-up 24 months after arthroscopy, the patients were examined to evaluate any objective instability or apprehension and scored according to the Constant shoulder evaluation system.⁷ At follow-up 10 years postoperatively, all were contacted by telephone for an interview, at which time a questionnaire was filled out and the Oxford self-assessment shoulder score was determined. If relevant, medical records were checked, and if there were shoulder problems, a clinical examination was performed.²⁶

Statistics comparing the 2×2 tables, a nonparametric Pearson test was used with a threshold of .05 for the *P* value. For comparison of the Constant score, a Student *t* test was performed via the SPSS statistical package (SPSS, Chicago, IL).

Material

In 4 patients no Bankart lesion²⁷ could be diagnosed, and they were excluded, resulting in 76 patients in the trial. Of these, 37 were treated with open Bankart repair and 39 had conservative nonsurgical treatment (Table 1).

Of the patients, 37 (49%) were injured while participating in sports, mainly from a fall on the extended arm or while in contact with an opponent. Injuries occurred as a result of a road traffic accident in 8 cases.

Of the patients, 74% had no abnormal findings on 45° craniocaudal-view radiographs, whereas 19% were diagnosed with a Hill-Sachs lesion and 4% had a minor osseous Bankart lesion. No difference was found when the 2 groups were compared.

At arthroscopy, the capsular and labral lesions were

TABLE 1. Randomization of Included Patients and Demographic Data

	Repair Group	Conservative Group
n	37	39
Age (y) [mean (range)]	23 (15-39)	20 (15-31)
Female/male ratio	7:30	7:32

No significant difference was found in age distribution or female/male ratio (Fisher exact test, $P > .05$).

classified according to Baker.⁴ We found a capsular tear with no labral lesion (type 1 lesion) in 6.6% of patients, a capsular tear and partial labral detachment (type 2 lesion) in 13.2%, and complete detachment of the anterior glenohumeral ligaments and complete labral disruption (type 3 lesion) in 80.3%.

RESULTS

Follow-up at 24 Months

At 24 months' follow-up, 22 patients had sustained a recurrent anterior dislocation: 21 of 39 (53.8%) who had primary nonsurgical treatment and 1 of 37 (2.7%) who had primary open Bankart repair ($P = .0011$) (Fig 1). The recurrence was sustained within the first 11 months after surgery in 64% (Fig 2). All redislocators had a Baker type 2 or 3 lesion.

When the nondislocators in the 2 groups were compared, no significant difference could be found according to the Constant score.

Surgical group: The 1 redislocator in the surgery group had an episode of recurrence while practicing swimming 8 months after surgery. Of the 36 patients who had no recurrence, 7% had a positive apprehension test and 4% had a grade 1 load-and-shift test (Table 2).

Conservative group: In the nonsurgically treated group the reason for redislocation was a new traumatic event in 18 cases (12 had sports injuries and 6 were injured during activities of daily living), with atraumatic redislocation in 3 cases. Of the nonsurgically treated patients who did not sustain a recurrent dislocation, 39% had a positive apprehension test and 39% had a grade 1 or 2 load-and-shift test.

In the conservatively treated group, 80% of patients with type 2 lesions and 53% of patients with type 3 lesions had recurrence within 2 years after primary trauma. Of the youngest patients (aged 15 to 24 years), 66% sustained a recurrence (Fig 3).

Follow-up at 10 Years

At 10 years' follow-up, all but one patient (in the repair group) could be tracked. The remaining 75 patients completed the telephone interview and filled out the questionnaire; in 20 patients who had further surgery, the records were checked, and 12 patients (6 in each group) had clinical examination.

Repair group: A further 2 patients from the repair group had had a recurrent dislocation (9%) at 10 years' follow-up. All 3 had significant trauma, and all were aged below 25 years. One underwent further surgical repair, which resulted in a poor outcome, and he still had instability. Four patients from the repair group complained of pain or stiffness.

When graded according to the Oxford shoulder score, 53% of patients in the repair group (19/36) had an excellent result and 17% (6/36) had good results.

Conservative group: Of the patients primarily treated conservatively, 24 (62%) had sustained a recurrent anterior dislocation of the shoulder joint. In 19 (80%) the shoulder was fixed with either an open (17) or arthroscopic (2) Bankart repair. Of those undergoing a secondary repair, 63% had a good or excellent subjective result (Oxford score), whereas 4 had re-dislocation. The 5 patients who did not undergo further surgical treatment were satisfied with their shoulder function and did not complain of instability at follow-up.

Of the remaining 15 patients who had no recurrence, 1 (3%) still had subjective instability and 4 (10%) complained of pain or stiffness of the shoulder.

Altogether, 29 of 39 conservatively treated patients had had a recurrence, subjective instability, or pain 10 years after primary arthroscopy, resulting in

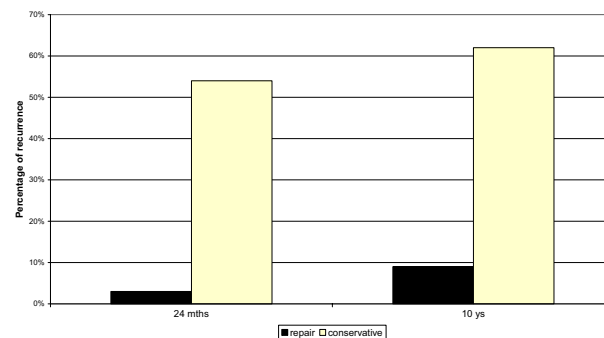


FIGURE 1. At 24 months and at 10 years after inclusion of patients into the study, the recurrence rate after open Bankart repair for traumatic primary anterior shoulder dislocation was found to be significantly lower than that after conservative treatment.

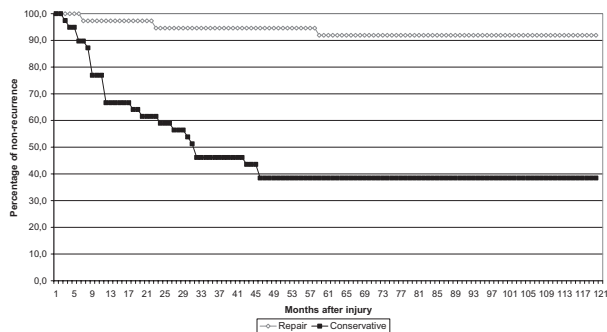


FIGURE 2. Survival curve of nonrecurrence after conservative and surgical treatment of anterior shoulder dislocation showing a significant difference in recurrence between the 2 treatment modalities. Recurrence was sustained in 64% of patients within the first 11 months after primary treatment.

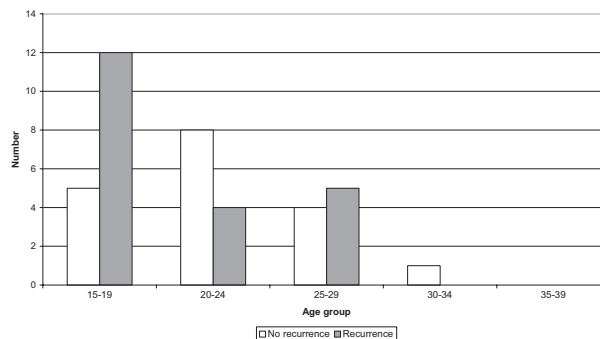


FIGURE 3. Recurrence at 24 months after traumatic anterior shoulder dislocation was treated conservatively in relation to patient age at time of injury. The number of recurrences was closely related to age, with the highest risk of recurrence in the younger age groups.

a rate of unsatisfactory results on the Oxford scale of 74%.

DISCUSSION

Anterior shoulder dislocation has been shown to occur mainly in younger active men and to have a further peak in elderly women.² In this consecutive series the age was restricted to 15 to 39 years, and a peak was found in male patients ranging in age from 15 to 24 years, supporting previous findings.⁹ In 49% of patients the injury happened while they were participating in sports.

In 4 patients no lesion of the anterior labrum or glenohumeral ligaments could be found. The explanation for this might be that the anterior capsule and glenohumeral ligaments were stretched and did not result in a complete rupture or that these patients had shoulders with prior laxity. These 4 patients were excluded from the material and thereby did not influence the results. When our results are compared with those of Baker et al.,⁶ the lesions described in our trial were more severe, with more patients who had grade 3 lesions. As would be expected, the patients with type 2 and 3 lesions had a worse outcome than those with

type 1 lesions; all redislocators in the conservatively treated group had type 2 or 3 lesions. Unfortunately, this trial could not show any prognostic value when type 2 and 3 lesions were compared; however, we did find a slightly higher risk of redislocation in patients with type 2 lesions than in patients with type 3 lesions.

Recurrent instability can impair the performance of young and active athletes, and recurrence rates of 79% to 94% in young and adolescent male patients seem unacceptable.^{3,5,14,28}

Aronen and Regan¹⁴ found a recurrence rate of 25% after intensified rehabilitation in young soldiers at the US Naval Academy followed up for a mean of 35 months, but to our knowledge, this effect of rehabilitation on the risk of recurrence has not been reported in other publications. Although Wintzell et al.^{18,29} found a beneficial effect of arthroscopic lavage on the recurrence rate, with a reduction from 60% to 20%, this could not be confirmed in our trial, because the conservatively treated patients, despite arthroscopic lavage, had a recurrence rate of 54% at 2 years.

Open Bankart repair with end-to-end suturing of the subscapularis tendon and capsule resulted in significantly reduced recurrence rates. At a minimum of 2 years' follow-up, 54% of patients had redislocation after arthroscopic lavage and rehabilitation alone, as compared with 3% after open surgical repair. In addition, among the nondislocators, the conservatively treated patients had significantly more instability as evaluated by the load-and-shift test and apprehension test. No complications were found in the repair group, and the mean Constant score was comparable. Nevertheless, one surgically treated patient had a fairly low score because of reduced external rotation and strength.

TABLE 2. Comparison of Objective Stability 24 Months Postoperatively in Cases of Nonrecurrence

	Conservative Group	Repair Group	Statistics
Positive apprehension test	39%	7%	$P = .014$
Load-and-shift test			
Grade 1	33%	4%	$P = .009$
Grade 2	6%		

When evaluated after 10 years, 62% of conservatively treated patients had had a recurrence compared with 9% in the repair group. On the basis of objective and subjective evaluation of nondislocators, we could demonstrate unsatisfactory results in 74% of conservatively treated patients, with good or excellent results in 72% of patients after open surgical repair (based on the Oxford shoulder score).

One of the weaknesses of the study is that it was performed as a multicenter study with several surgeons. We tried to reduce the disadvantages by gathering all experienced surgeons before the study was begun and teaching everyone the arthroscopic evaluation system, the Constant score measures, and the surgical technique in a cadaver laboratory. The 10-year evaluation was performed as a telephone interview, which did not give us the opportunity to examine range of motion or any signs of osteoarthritis.³⁰

Magnetic resonance imaging was not used in the evaluation of intra-articular lesions before inclusion in this study. We have previously shown that conventional magnetic resonance imaging was only moderately reliable in the preoperative evaluation of labral tears and Hill-Sachs lesions and that it failed to provide an accurate, differentiated preoperative diagnosis of capsulolabral lesions.³¹

Results similar to ours were found by Kirkley et al.³² in a randomized study, who found recurrence in 16% of patients after arthroscopic repair in those with a first-time anterior dislocation compared with 47% after a rehabilitation program. In a nonrandomized study Arciero et al.³³ reported a recurrence rate of 80% after immobilization for 1 month compared with a recurrence rate of 14% after arthroscopic repair. In this study open repair was done secondary to arthroscopic evaluation and lavage, because at the time of inclusion, we found the arthroscopic repair to be inferior and unsuitable for a multicenter study with several surgeons. Although we found even better results after open repair compared with Kirkley et al., the surgical risk might be higher with open repair compared with arthroscopic repair. Comparing arthroscopic and open repair in chronic cases, Jorgensen et al.³⁴ found equivalent results after 36 months.

Of the redislocators in the conservative group who underwent a secondary Bankart procedure, 63% had good or excellent results; however, 4 who had secondary repairs still sustained a re-redislocation, and all of the remaining patients who did not undergo further surgery had instability, pain, or stiffness.

CONCLUSIONS

Arthroscopic evaluation after a first-time anterior shoulder dislocation revealed a Baker type 2 or 3 lesion in 93.5%. This study found significantly more redislocators after conservative treatment than after repair. At 2 years' follow-up, 21 (54%) of the conservatively treated patients had recurrence, as compared with 1 (3%) after open surgical repair. After 8 years, a further 3 patients in the conservatively treated group had a redislocation, 1 had subjective instability, and 4 had pain or stiffness, resulting in 74% having unsatisfactory results according to the Oxford score. Of the patients who had surgical repair, 72% had good or excellent results after 10 years.

Because open repair yields superior results compared with conservative treatment, we recommend that the surgeon consider primary repair in active patients to reduce the risk of recurrence.

Acknowledgment: The authors would like to acknowledge the following people who supported the study: R. Ejsted, J. Hedeboe, A. Holm, K. Hougaard, T. Toftgaard-Jensen, M. Juhl, S. B. Kalms, J. Kampmann, J. L. Kristensen, T. Laulund, S. S. Mikkelsen, B. Nue-Møller, and O. Sneppen.

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