

Original Article

Comparison of arthroscopic treatment with conservative treatment for acute first-time traumatic anterior shoulder dislocation in a high-demand population

Wei-Yu Shih, Sheng-Tsai Hung, Jui-Tien Shih, Hung-Maan Lee*, Yuh-Juin Ho

Department of Orthopaedic Surgery, Taoyuan Armed Forces General Hospital, Taoyuan County, Taiwan

A B S T R A C T

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Purpose: To compare the outcome of primary arthroscopic stabilization with that of nonoperative treatment for acute first-time traumatic anterior shoulder dislocation in a highly active military population at 5- to 7-year follow-up.

Methods: The patients in this prospective, nonrandomized study comprised 64 highly active military personnel with a first episode of traumatic anterior shoulder dislocation that occurred during the period January 2001 to July 2004. The patients were offered an arthroscopic procedure or nonoperative treatment. The average age was 22 years (range, 17–29 years). A total of 25 patients were treated by nonoperative methods and 39 patients underwent acute arthroscopic repair with metallic suture anchor fixation. Outcome was evaluated based on the Western Ontario Shoulder Instability Index score, the Disabilities of the Arm, Shoulder and Hand score, range of motion, and return to active duty. The mean follow-up was 71 months (range, 60–84 months).

Results: In the nonoperative group, 92% suffered a redislocation between 5 and 18 months (average, 10 months). In the operative group, only two patients (5.1%) suffered a redislocation 1 year after surgery. There were no surgical complications. In addition, there was no statistical difference in range of motion of injured sites between the two groups.

Conclusions: Primary arthroscopic stabilization leads to a significantly lower rate of recurrence of shoulder dislocations than nonoperative treatment in high-demand populations. In addition, there is no significant difference of recurrence rate and functional outcome between the surgical group and the nonoperative groups with recurrent dislocation undergoing arthroscopic stabilization at the final follow up.

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1. Introduction

Anterior shoulder dislocation is a common injury among young adults and accounts for 50% of all major joint dislocations.^{1,2} Common complications of traumatic shoulder dislocation include recurrent instability and subluxation, especially in young, active patients who have undergone nonoperative treatment. Wheeler et al³ observed a 92% rate of recurrence of instability after nonoperative treatment in United States Military Academy cadets and Arciero et al⁴ reported a recurrence rate of 80% among cadet athletes at a United States Military Academy. DeBerardino et al⁵ found an 85% recurrence rate at 10-year follow-up in nonoperatively treated individuals at a United States Military Academy. Several studies have shown that the recurrence rate is higher in young patients who have undergone traditional nonoperative

treatment than in patients who have undergone operative treatment.^{2,4–8} Most studies, however, have mixed populations with respect to age and activity demand, two factors that are associated with recurrence rate. Studies have shown that the recurrence rate is lower in patients who received initial arthroscopic stabilization than in those who received nonoperative treatment after a traumatic anterior shoulder dislocation.^{4,7–14} The purpose of this study was to compare the effectiveness of arthroscopic stabilization with that of traditional, nonoperative treatment for acute first-time traumatic anterior shoulder dislocation in a highly active young military population.

2. Materials and methods

The patients in this prospective, nonrandomized study comprised military personnel under the age of 30 years who underwent either arthroscopic stabilization or nonoperative treatment for an acute first-time traumatic anterior shoulder dislocation during the period January 2001 to July 2004. Reduction

* Corresponding author. Department of Orthopaedic Surgery, Taoyuan Armed Forces General Hospital, 168, Jong-Shing Road, Taoyuan County, Taiwan. Tel.: +886 3 499 3070; fax: +886 3 489 8976.

E-mail address: weiyu.shih804@gmail.com (H.-M. Lee).

of shoulder dislocation was performed in the emergency department in all patients. All of the patients were referred from the emergency department to our orthopedic clinic within 24 hours after reduction. The study inclusion criteria were: (1) radiographic confirmation of traumatic first-time anterior shoulder dislocation requiring manual reduction; (2) active-duty military personnel; (3) skeletally mature patients under the age of 30 years; (3) dislocation without fracture or neurological injury; and (4) no history of previous shoulder surgery or multiple ligament laxity. All patients were informed of the high recurrence rate associated with anterior shoulder dislocations in young active individuals as well as the failure rates associated with two different methods of conservative treatment and arthroscopic stabilization. After a thorough discussion, patients were allowed to choose either conservative or arthroscopic treatment.

2.1. Operative group

In the operative group, the mean average duration from initial dislocation to surgery was 5 days (range, 1–12 days). Range of motion and anterior and posterior drawer tests for shoulder stability were performed in the beach chair position under general anesthesia. Translation of the humeral head to the edge of the glenoid was rated 1+, translation anterior to the glenoid with spontaneous reduction was rated 2+, and a nonspontaneously reduced dislocation was rated 3+. Bone landmarks were identified with a skin marker to assist in portal positioning. Initial systematic diagnostic arthroscopy was performed via a standard posterior portal, and an anterosuperior portal was established by an outside-in technique. Specific sites of examination included the glenohumeral articular surfaces, the biceps tendon and anchor, the entire glenoid labrum, and the rotator cuff. After identifying the Bankart lesion (Fig. 1), an anterior-inferior portal was established for labral reconstruction. All repairs were performed with 2.8-mm FASTak metallic suture anchors (Arthrex, Naples, Florida, FL, USA) and usually two to three anchors for repair of a Bankart lesion were used. After debridement of unstable labral flaps and abrasion of nonarticular bony beds with a 4.5-mm motorized shaver or a 3.5-mm bur, suture anchors were inserted into the glenoid rim at an angle of approximately 45°. The drill holes were spaced as far apart as possible at the 3-, 4-, and 5:30-o'clock positions on the glenoid (right shoulder) depending on the degree of anterior-inferior glenohumeral ligament detachment. A single vertical stitch from each anchor was placed around the inner edge of the labrum centrally and through the capsulolabral tissue peripherally with a 2.7-mm penetrator Suture Retriever (Arthrex, Inc, Naples, FL); 3.4mm grasper (Acufex, Smith & Nephew, Huntingdon, UK). A modified Duncan knot was tied with three alternating half hitches to secure the labrum to the glenoid. Additional suture anchors were inserted as needed. After surgery, postoperative rehabilitation protocol was the same as that for patients who received nonoperative treatment. A representative case is shown in Fig. 2.

2.2. Traditional nonoperative group

A standard shoulder sling was used to immobilize the upper extremity for 4 weeks. During this time, patients were allowed to remove the sling for bathing and mobilizing the elbow and wrist. At 4 weeks after dislocation, the patients began a physiotherapy program to rehabilitate the shoulder.

2.3. Rehabilitation protocol

All patients were prescribed the same rehabilitation protocol. Sling immobilization, pendulum exercises, and active elbow

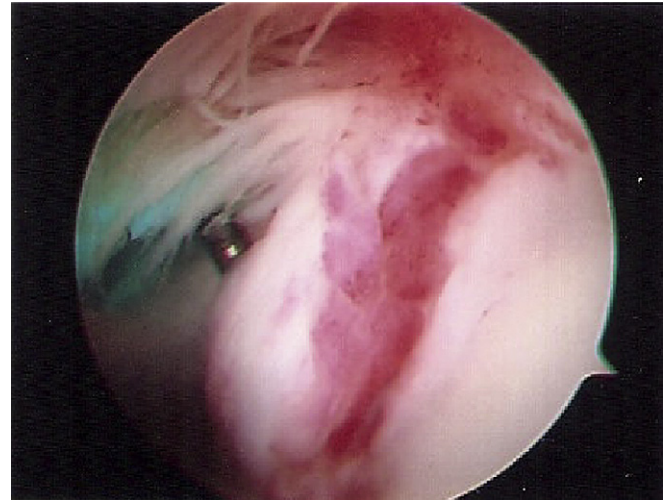


Fig. 1. Arthroscopic view from the posterior portal shows a classic Bankart lesion with detachment of the labrum from the underlying glenoid.

exercises were initiated for the first 4 weeks. During the next 4-week period, simple shoulder exercises comprising single plane movements and vertical arm elevation were begun in forward elevation, internal rotation, and external rotation with the arm adducted. Beginning at Week 8, complex exercises of the shoulder combining the different plane movements, including abduction with external rotation, were begun. Three months later, patients progressed to an aggressive exercise program. Full participation in throwing sports was allowed after 6 months.

2.4. Evaluation of results

Functional outcome was evaluated based on the Western Ontario Shoulder Instability Index (WOSI)^{7,15} and the Disabilities of the Arm, Shoulder and Hand (DASH)¹⁶ scores at a mean follow-up of 71 months (range, 60–84 months). The WOSI and DASH scores were analyzed with separate independent *t* tests. Other outcome measures included return to full active duty (ie, achieved or not achieved), range of motion, and overall satisfaction (ie, satisfied or not satisfied). Poor outcome was defined as a redislocation episode after the first dislocation. Statistical analysis of data was performed with SPSS software version 12 (SPSS Science Inc, Chicago, IL, USA). The Student's *t* test was used to evaluate differences in range of motion between the injured shoulder and uninjured shoulder. Differences were considered significant at $p < 0.05$.

3. Results

A total of 67 patients fulfilled the inclusion criteria. Among the 67 patients, 3 were lost to follow-up. Therefore, the final study population was 64 patients. Among these patients, 39 (60.9%) underwent primary anterior shoulder stabilization with suture anchors by one senior surgeon and 25 (39.1%) received immediate immobilization followed by physiotherapy. The mean age of patients in the arthroscopic treatment group was 21.9 years (range, 18–29 years) and the mean age of patients in the nonsurgical treatment group was 22.1 years (range, 17–29 years). There was no significant difference in age between the two groups ($p = 0.785$). Patient characteristics are listed in Table 1. In the arthroscopic group, hemarthrosis, Bankart lesions, and Hill-Sachs lesions were noted in all patients during the arthroscopic procedure. None of the patients had arthroscopic evidence of partial or complete tear of

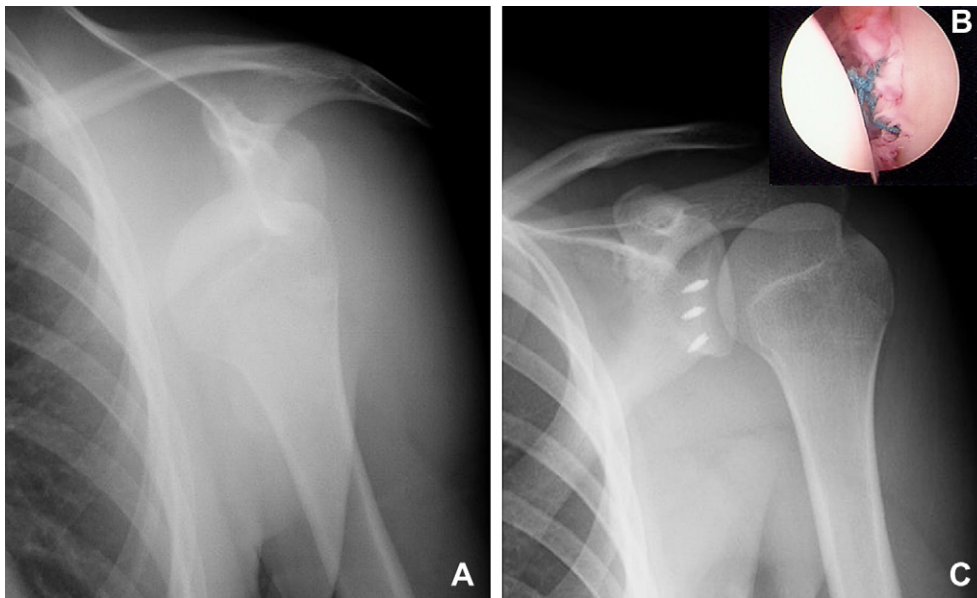


Fig. 2. A 19-year-old soldier received arthroscopic stabilization with FASTak suture anchor fixation for traumatic first-time anterior shoulder dislocation. (A) Preoperative radiography showing left shoulder anterior dislocation. (B) Completed three suture anchors repair. (C) Postoperative radiography.

the rotator cuff or long head of the biceps. Superior Glenoid Labrum Lesions (SLAP) lesions were noted in conjunction with Bankart lesions in three patients (7.7%). The SLAP lesions were classified as Type II in two patients and Type I in one patient. Type II lesions were stabilized with additional suture anchors as indicated. The Type I lesion was debrided. The presence of a SLAP lesion did not alter the postoperative regimen. The mean number of suture anchors for repair of Bankart lesions was 4.1 (range, 3–5). No intraoperative complications or nerve function impairment occurred in any patient and no clinical signs of stiffness or wound infection were noted during follow-up.

In the nonoperative group, 23 patients (92%) suffered a redislocation between 5 and 18 months after treatment (mean, 10 months). Among the 23 patients, 13 (56.5%) went on to have an arthroscopic treatment and six of them went on to have an open Bankart reconstruction. In the operative group, only two patients (5.1%) suffered a redislocation 1 year after surgery. One suffered a second traumatic redislocation as a result of a motor vehicle traffic accident 9 months after his initial surgery. The patient underwent a second arthroscopic procedure. The other patient whose operative treatment failed went on to have an open Bankart reconstruction. One patient in the surgical group (2.7%) had recurrent posterior instability (subluxation) and a positive apprehension test.

At 18-month follow-up, the mean WOSI score in the nonoperative group was 448 (range, 125–850) and that in the arthroscopic group was 254.1 (range, 20–520). The difference in mean WOSI score between the two groups was significant ($p < 0.05$). The mean DASH score in the nonoperative group was 316.4 (range, 75–795)

Table 1
Demographic data of nonsurgical group and surgical group.

Patient demographics	Nonsurgery (n = 25)	Surgery (n = 39)
Age at first dislocation	22.9 (17–29)	21.5 (18–29)
Gender male:female	25:0	34:0
Hand dominance right:left	23:2	29:5
Injury dominance/noninjury dominance	16/9	13/21
Sport/nonsport	18/7	27/12
Duration of follow-up (mo)	70.4 (60–84)	72.6 (62–88)

and that in the arthroscopic group was 229.1 (range, 0–485). The difference between the two groups was significant ($p < 0.05$). At the final follow-up examination, there were no significant differences in mean WOSI or mean DASH scores between the two groups (Table 2). Follow-up range of motion was determined at 1, 3, and 5 years after injury or surgery. There was no statistical difference in range of motion between shoulders treated surgically and those treated nonoperatively. The average loss of external rotation in the nonoperative group was 4° (range, 0°–14°). In the arthroscopic group, the average loss was 4° (range, 0°–12°).

4. Discussion

Many studies have documented a high rate of redislocation after nonoperative treatment for acute traumatic first-time anterior shoulder dislocation in military populations.^{4–6,8–10,12,17} Bottoni et al¹⁰ reported a recurrence rate of 75% among 12 active-duty military personnel after nonoperative treatment. In addition, six of the nine patients who suffered recurrent instability required subsequent open Bankart repair. The recurrence rate at 12-month follow-up after arthroscopic Suretac repair in a small group of patients was 11.1% (one of nine patients). This finding suggests a possible role for arthroscopic repair in acute traumatic first-time anterior shoulder dislocation. The failure rate in the nonoperative treatment group in our study is similar to that reported in numerous studies on first-time shoulder dislocations in young military populations.

Table 2
Results of functional outcome at 18 month and final follow up (mean ± SD).

Functional outcome	Nonoperative group (n = 25)	Arthroscopic group (n = 39)	p*
WOSI (18 mo)	448 ± 193.78	254.1 ± 134.97	<0.05
WOSI (final f/u)	316.4 ± 170.17	229.1 ± 118.49	0.18
DASH (18 mo)	16.9 ± 10.49	6.54 ± 5.24	<0.05
DASH (final f/u)	7.27 ± 9.21	5.1 ± 4.54	0.215

* Unpaired Student t test.

DASH = Disabilities of the Arm, Shoulder and Hand; f/u = follow-up; SD = standard deviation; WOSI = Western Ontario Shoulder Instability Index.

Few studies have reported on the clinical descriptions of pathologic changes after acute anterior dislocations. Baker et al¹⁸ described three types of Bankart lesions in their series of acute dislocations. Partial or complete Bankart lesions were observed in 87% of the patients (39 of 45). Norlin¹⁹ evaluated 24 cases of first-time anterior shoulder dislocation using arthroscopy. All shoulders had Bankart and Hill-Sachs lesions. The findings in those reports correspond with our surgical findings.^{18,19} The potential high risk factors for recurrent instability are short periods of immobilization, bony Bankart lesions, associated generalized ligamentous laxity, Hill-Sachs lesions, contact or collision sports, young age, inverted glenoid configurations, poor glenohumeral ligament quality, and the use of fewer than three suture anchors.^{3,11,20–25} Outcome of arthroscopic repair has improved considerably over the last 10 years because of improved instrumentation, implants, fluid delivery systems, surgical techniques, and postsurgical care. The choices of arthroscopic technique include capsulolabral repair, bioabsorbable tacks, and metallic- or biosuture anchor techniques with or without knots.^{7,8,13,17,26–32} Many reports have documented a lower incidence of redislocation after arthroscopic treatment than after nonoperative treatment of acute traumatic shoulder dislocation. The recurrence rates range from 4% to 22% in athletes and in physically active young people.^{4,8,10,12–14} However, the rate of recurrence in the operative group in our study was 2.7% ($n = 1$), whereas that in the nonoperative group was 92% ($n = 23$). The difference in rate of recurrence was significant ($p = 0.001$).

In this study, there was no significant difference in rate of recurrent dislocation between the two groups at 18-months follow-up. Although the WOSI and DASH scores at 18 months differed significantly between the two groups, there were no significant differences in scores between the operative and nonoperative groups at final follow-up. The limitations to our study include the small number of patients and unequal numbers of patients in the two groups without randomized. At 5- and 7-year follow-up, most patients (97%) had excellent or good clinical outcomes and were able to return to active duty.

5. Conclusions

Primary arthroscopic stabilization leads to a significantly lower rate of recurrence of shoulder dislocations than nonoperative treatment in high-demand populations. In addition, there is no significant difference of recurrence rate and functional outcome between the surgical group and the nonoperative groups with recurrent dislocation undergoing arthroscopic stabilization at the final follow up.

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