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Arthroscopic procedures for the treatment of anterior shoulder instability: local experiences

在香港醫院進行關節鏡手術治療前肩關節不穩定的經驗

Objective. To review the outcomes of arthroscopic stabilisation procedures for the treatment of recurrent anterior shoulder dislocation.

Design. Retrospective study.

Setting. Regional hospital, Hong Kong.

Patients. Patients receiving arthroscopic stabilisation procedures for recurrent anterior shoulder dislocation between 1999 and 2003.

Main outcome measures. Functional outcomes including pain, range of motion, and activity level were assessed using the Constant score. Intra-operative findings were also discussed.

Results. A total of 18 arthroscopic stabilisation procedures were performed for the treatment of recurrent shoulder instability. Two cases converted to open procedures were excluded from this review. The overall outcomes were good and seven patients reported a full recovery. Fourteen out of 16 patients reported minimal or no pain, and the mean Constant score was 80. There were no cases of re-dislocation and no major complication was noted.

Conclusion. All the reviewed patients had a satisfactory functional recovery. Therefore, we believe that the use of arthroscopic stabilisation procedure can produce a favourable outcome for appropriate shoulder pathologies.

目的：回顧以關節鏡手術治療復發性前肩脫位的結果。

設計：回顧研究。

安排：地區醫院，香港。

患者：1999 至 2003 年期間，以關節鏡手術治療復發性前肩脫位的病者。

主要結果測量：利用康斯特計分法評估各項功能結果，包括疼痛情況、移動範圍、活動指數，並且討論術中的具體發現。

結果：共18位肩部不穩定的患者接受關節鏡手術，其中兩名須轉做開放式手術的病人並不在本文的討論範圍內。整體效果令人滿意，七名病人最後可完全康復。16 名病人當中，14 個出現極度輕微甚至沒有出現疼痛情況，康斯特平均分為 80；沒有病者出現肩部再次脫位或主要併發症。

結論：患者的康復程度令人滿意。我們相信關節鏡手術對部份肩部疾病具有正面的療效。

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Introduction

Over the past decades, the treatment of anterior shoulder instability has evolved substantially with various open and arthroscopic techniques having been developed. However, it is sometimes difficult for a general orthopaedic surgeon to decide on the most appropriate treatment for a given patient.[1] Arthroscopy is playing a more important role in the treatment of patients with shoulder instability. Advantages of arthroscopic

techniques include less surgical trauma, increased visualisation, ability to debride labral tears, minimal loss of external rotation, and low cost. These techniques can also be performed in a day-patient setting.[2] The disadvantages include the high recurrent instability rate and the steep learning curve of a highly technically demanding procedure.[3] The purpose of this review is to share our experiences of arthroscopic stabilisation as the treatment for recurrent traumatic unidirectional shoulder instability.

Methods

Between 1999 and 2003, arthroscopic stabilisation procedures were performed on 18 patients with recurrent shoulder instability. Sixteen cases were performed in Kwong Wah Hospital and two cases in Caritas Medical Centre, Hong Kong. Two of the 18 cases were found to have an absent anterior labrum and capsular tissue that were not suitable for arthroscopic repair. These two patients had anterior shoulder dislocation more than 5 times. In each case, the surgery was subsequently converted to an open procedure with a good outcome. These two cases were excluded from the current study and only the remaining 16 cases were discussed in this review.

Medical history detailing the mechanics involved in the dislocation, outcome, functional status, and physical examination was reviewed. None of the patients had previous surgical procedures on the affected shoulder, and there were no cases of first-time dislocation. The Constant and Murley Functional Rating (Table 1) was used for assessment of the functional outcome and the level of pain.[4] Radiographic evaluation included standard anteroposterior, lateral, and special views. Radiography and magnetic resonance imaging with adjustable contrast were also performed to confirm the presence or absence of the anterior labrum.

Clinical examination and operative techniques

A single orthopaedic surgeon, who was familiar with the arthroscopic stabilisation technique, performed all of the procedures. All patients were under general anaesthesia, which was supplemented with a regional interscalene block accordingly, depending on the assessment of the anaesthetist. The patients were examined under anaesthesia to confirm the direction of the instability. In all cases, lateral positioning with longitudinal and lateral traction was performed by means of pulley traction. Fluid irrigation was by gravity alone and adrenaline was not needed. The systolic blood pressure was maintained at approximately 100 mm Hg. Three portals were used for

Table 1. The Constant and Murley Functional Rating*

Characteristic	Score
Pain	
None	15
Mild	10
Moderate	5
Severe	0
Activities of daily living	
Activity level	
Full work	4
Full recreation/sport	4
Unaffected sleep	2
Positioning	
Up to waist	2
Up to xyphoid	4
Up to neck	6
Up to top of head	8
Above head	10
Range of motion (degrees)	
Abduction	
0-30	0
31-60	2
61-90	4
91-120	6
121-150	8
151-180	10
Flexion	
0-30	0
31-60	2
61-90	4
91-120	6
121-150	8
151-180	10
Internal rotation	
Dorsum of hand to lateral thigh	0
Dorsum of hand to buttock	2
Dorsum of hand to lumbosacral junction	4
Dorsum of hand to waist	6
Dorsum of hand to 12th dorsal vertebra	8
Dorsum of hand to interscapular region (T-7)	10
External rotation	
Hand behind head with elbow held forward	2
Hand behind head with elbow held back	4
Hand on top of head with elbow held forward	6
Hand on top of head with elbow held back	8
Full elevation from top of head	10
Power (pounds)	0-25

* Maximum score is 100: 90-100 is excellent; 80-89 is good; 70-79 is fair; <70 is poor

this procedure: a posterior portal was used for the initial inspection and guidance of the other portals, an anterior portal was made lateral to the coracoid process as close to the subscapularis tendon as possible, and an additional superior portal was also made. The portals were established before any procedure to minimise extravasation of fluid. We did not encounter any visualisation problems with this regimen.

In all the patients, the load and shift test was positive, and examination under anaesthesia showed physical signs consistent with unidirectional anterior instability with or without impingement. The biceps
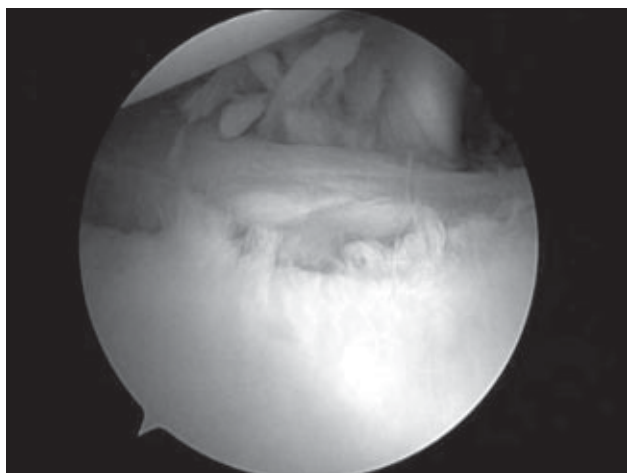
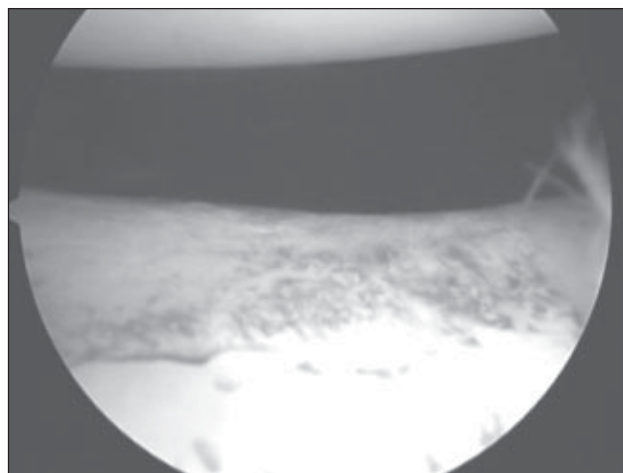Fig 1. Intra-operative photo showing a Bankart lesion

Fig 2. Intra-operative photo showing the absence of the anterior labrum

Table 2. Summary of the intra-operative findings

Case No.	Sex/Age (years)	No. of dislocations	Superior labral anteroposterior lesion	Bankart lesion	Hill-Sachs lesion	Method of repair	Constant score
1	M/18	2	No	Yes	Yes	Bioabsorbable tack	75
2	M/24	4	No	No	Yes	Suture anchor and capsular plication	75
3	M/18	>10	No	Yes	Yes	Suture anchor and capsular plication	85
4	M/25	3	No	Yes	Yes	Suture anchor	75
5	F/43	2	No	Yes	Yes	Suture anchor	75
6	M/21	2	No	Yes	Yes	Suture anchor	75
7	M/23	2	No	No	Yes	Suture anchor and capsular plication	80
8	M/18	2	No	No	Yes	Suture anchor and capsular plication	84
9	F/35	5	No	Yes	Yes	Suture anchor and capsular plication	70
10	M/23	5	No	Yes	Yes	Suture anchor	80
11	M/23	8	Type II	Yes	Yes	Suture anchor	80
12	F/32	10	No	No	Yes	Suture anchor and capsular plication	85
13	M/29	2	Type II	No	Yes	Suture anchor and capsular plication	85
14	M/16	4	No	Yes	Yes	Suture anchor and capsular plication	85
15	M/25	3	No	Yes	Yes	Suture anchor and capsular plication	85
16	M/16	3	No	Yes	Yes	Suture anchor	82

tendon and rotator cuff were also intact in all cases. Eleven patients had both Bankart (Fig 1) and Hill-Sachs lesions at the time of surgery. Five patients had an absent anterior labrum (Fig 2) but a Hill-Sachs lesion at the time of repair. Among the 16 patients, two had associated type II superior labral anteroposterior (SLAP) lesions—one had type II SLAP lesion together with Hill-Sachs and Bankart lesions, another had type II SLAP and

Hill-Sachs lesion, and an absent anterior labrum (Table 2).

Fifteen cases were stabilised with suture anchors (Fig 3) and the remaining patient was stabilised with bioabsorbable tack (Suretac; Acufex Microsurgical, San Antonio, United States). Thermal capsulorrhaphy was performed in eight of the patients who had arthroscopic stabilisation using a suture
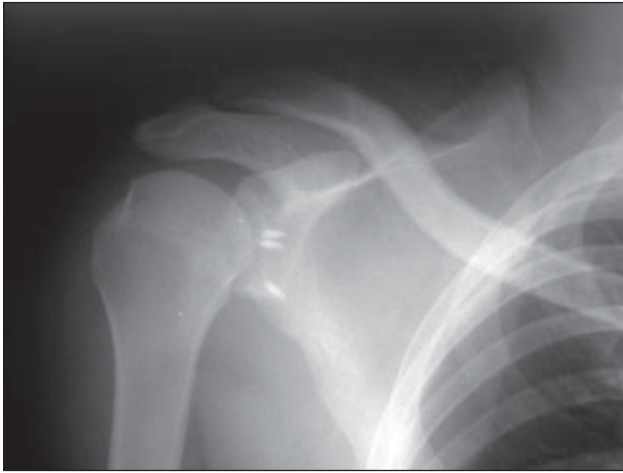
Fig 3. Postoperative radiograph showing the position of the suture anchors

anchor. Capsular plication was performed in nine patients, including those five patients with absent anterior labrum at the time of repair. Because all patients in the series had unidirectional anterior dislocations, capsular plication was performed on only the anterior capsulolabral complex and not the posterior capsule.

Rehabilitation and follow-up
Postoperatively, all patients were treated with a similar rehabilitation protocol. A shoulder immobiliser was used to keep the arm in internal rotation for 6 weeks. Active hand, wrist, and elbow exercises were started immediately after operation. Pendulum exercises were allowed after the first week, and active and passive range of motion (ROM) exercises were allowed at 3 weeks. Abduction above 90 degrees and external rotation beyond the neutral position were restricted. Progressive resistive exercises began after 6 weeks, and gradual return to sports was allowed at 6 months postoperatively.

At follow-up, patients answered a set of standard questions related to the stability and function of the shoulder, pain, and activity level. The ROM was measured according to the Constant score criteria. The surgery was considered failed if patients had recurrent dislocation or experienced a sense of instability that resulted in the inability to work and play sport, or that resulted in a second operation.

Statistical analysis was performed using the Statistical Package for the Social Sciences, version 12.0 (SPSS, Chicago [IL], United States). Mean Constant scores among different groups were calculated using two-tailed *t* test, and a P value of 0.05 or lower was regarded as statistically significant.

Results

Sixteen patients (13 male, 3 female) were reviewed. Injuries occurred equally between dominant and non-dominant extremities with equal numbers on the right and left side. All the patients had a history of a specific traumatic event that preceded the initial instability. Eight of the injuries were sports-related: four from basketball, one from rugby, one from badminton, one from football, and one involving the high jump. The other seven cases had a history of either direct contusion or a fall injury. The remaining patient was injured in a road traffic accident. None of the patients had osseous Bankart lesion or loose body. The mean age at first consultation was 24.3 years (range, 16-43 years), and the mean age of first traumatic event was 22.2 years (range, 12-31 years). The mean number of dislocations per patient was greater than 3, with a range from 2 to more than 10 dislocations.

The mean time from the initial traumatic event to the arthroscopic anterior stabilisation operation was 54.4 months (range, 9.5-180 months). The mean time from first consultation to the time of the operation was 14.3 months (range, 2-39 months). The mean hospital stay was 2.7 days (range, 2-6 days). The mean recovery time was 6 months (range, 3-15 months) with 13 patients recovering in less than 6 months. The mean follow-up period was 27 months (range, 6-57 months). Nine of the patients were followed up for more than 2 years.

The mean Constant score was 80 (range, 70-85); the lack of adequate abductor power was the main reason for this level of scoring. Ten of the patients had a Constant score equal to or greater than 80, and their outcome was good. All the patients could return to their primary work and daily activities without any major limitations within 3 to 15 months postoperatively. Seven of them reported that they had fully recovered with no restriction to normal daily activity. Among the sports-injury–related cases (n=8), four of them could resume the sporting activities of their previous level. The remaining four cases could participate in sports after mild modifications to these activities were made.

The forward flexion and abduction of the shoulder were not noticeably decreased in the patients postoperatively. Four patients showed a slight reduction in internal rotation, and all cases exhibited a small

Fig 4. Radiograph of a patient showing mild expansion of the bioabsorbable anchor insertion site 1 year postoperatively

decrease in the external rotation when assessed using the Constant score. Fourteen patients reported minimal or no pain, one patient had mild residual pain, and another had moderate pain despite a long course of physiotherapy. No statistically significant differences were seen in the outcomes, as measured using the Constant score, for the age of first dislocation or for the use of supplementary thermal capsulorrhaphy or additional capsular plication (P>0.05, two-tailed *t* test). Patients without Bankart lesion achieved a better Constant score than those with a Bankart lesion, but this difference was not statistically significant (P>0.05, two-tailed *t* test).

No major complications or postoperative re-dislocations were noted in this review. Two patients presented with transient numbness over the hands, which subsequently subsided. One case showed mild expansion of bioabsorbable tack insertion site (Fig 4). One patient had the suture anchor fractured with one of the anchor eyelets breaking off during the operation; additional anchors were used in these two cases.

Discussion

Because our understanding of shoulder conditions and surgical techniques improve, more types of shoulder pathology become amenable to arthroscopic surgical procedures.[5] A number of reports have shown that the outcome of arthroscopic Bankart surgery is comparable to that of open methods.[6] According to Geiger et al,[7] factors that may contribute to the high rate of

recurrent instability after arthroscopic Bankart repair include the surgical technique, patient's compliance, and the ability to evaluate the pathology.[7]

Our study showed that not all patients with a dislocation have the classic Bankart lesion, in which the labrum is detached from the rim and the capsule stripped from the anterior glenoid neck; this finding is consistent with some reports in the literature.[8-10] Interestingly, the outcome was shown to be better in those cases that did not have Bankart lesion compared with those that did (P>0.05, two-tailed *t* test). In our review group, all patients with Bankart lesions were associated with either Hill-Sachs lesion (n=10) or combined with type II SLAP and Hill-Sachs lesions (n=1). Capsular plication can be one of the methods to stabilise the shoulder in cases of the absence of an anterior labrum. Moreover, Bigliani et al[11] have shown that capsular stretching may precede actual labral detachment, and thus, plays a role in recurrent anterior instability. This capsular stretching may account for the success seen in procedures designed to eliminate capsular laxity.[12] In this study, five patients had an absence of anterior labral tissue that was stabilised with capsular plication. For the cases that had identifiable Bankart lesions, patients who had capsular plication in addition to the labrum repair had a slightly higher Constant score compared with those with only the latter repair; however, the difference was not statistically significant (P>0.05, two-tailed *t* test). Thermocapsulorrhaphy and capsular plication as a supplementary procedure was used based on the experienced surgeon's clinical decision. This supplementary procedure was used more frequently in some earlier cases but is not considered necessary in our current routine practice.

The Bankart lesion, which is the detachment of the anterior-inferior labrum, was previously considered the major contributing factor to the recurrent instability. However, our current knowledge indicates that a number of other lesions also contribute to the subsequent instability.[13] These lesions include detachment of the labrum from inferior and superior attachment, capsular elongation, plastic deformation of the glenohumeral ligaments, and rotator interval tear. It is important to identify these pathologies and repair them accordingly. In the absence of the anterior labrum, possibly due to repeated dislocation and trauma, stabilisation may still be performed arthroscopically. The capsule can be advanced onto the glenoid articular cartilage surface and repaired with suture anchors to create a 'labral bumper' that stabilises the glenohumeral joint.

It has been postulated that arthroscopic techniques using suture anchors can provide postoperative stability with better outcomes compared with conventional arthroscopic repair techniques in terms of the recurrence rate, activity, and ROM. This suture anchor technique involves individual knot tying with non-absorbable sutures and a capsular shift incorporated into the labral repair.[14,15] Although objectively, there was a slight decrease in the postoperative ROM particularly in the external rotation, the majority of our patients were able to return to work and to resume their daily activity. Seven of the patients considered themselves to be fully recovered, despite a mild decrease in external rotation during the clinical assessment. The objective findings, eg loss of ROM, did not affect the patients' subjective feeling of stability which allowed them to be fully active again.

The potential shortcomings of this review were the small number of cases (n=16) and the relatively short follow-up period. The treatment of anterior shoulder instability requires an accurate diagnosis, a detailed operative plan, the appropriate facilities and experience for the arthroscopic procedure, and a sound rehabilitation programme.[16] With our small series, we agree that it is difficult to conclude that this arthroscopic procedure is superior to conventional open reconstruction. There are many reports in the literature showing that arthroscopic procedure is as effective as the open procedure, and there are some indicating that this technique gives better results.[17,18] Furthermore, various long-term studies of open procedures demonstrated that the recurrent dislocation rate is not as low as initially reported.[6,7] The arthroscopic procedure can be used to recognise and treat associated lesion (eg SLAP lesion) that may not be detectable with the open methods. This study demonstrated that for appropriate pathologies, the arthroscopic procedure, when performed in the correct manner, can produce a favourable outcome.

Acknowledgement

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