

The role of arthroscopy in the revision of failed Latarjet procedures

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Abstract Glenohumeral instability is an intrinsic pathological condition of the shoulder, owing to its ample range of mobility that predisposes this joint to a somewhat limited degree of stability. Several techniques have been employed for the treatment of instability. Among these, one is the Latarjet procedure, recommended for cases of substantial bone deficit on the humeral head or on the anterior region of the glenoid. Such technique gives generally good, long-term results, considering the low incidence of recurrence. However, potential complications such as glenohumeral arthrosis, absorption of the bone block, breakage, malpositioning or mobilization of the screws, infections, neurological or vascular complications can be serious. Moreover, as a result of further severe trauma, the shoulder can become again globally unstable. In such cases, the question arises of which technique to employ in surgical revision, since the Latarjet procedure determines substantial subversion of glenohumeral anatomy. The aim of the study was the analysis of arthroscopical treatment after failure of a Latarjet procedure and to describe the related definitive results. During the period between January 2000 and June 2007, we treated 17 patients (18 shoulders) using arthroscopy, following failure

of an open Latarjet surgical procedure. One patient was operated bilaterally. Clinical revision according to the Constant Score, ROWE, ASES, UCLA and the VAS scale for pain evaluation was carried out during follow-up examination after an average period of 5 years and 9 months (min. 2 years–max. 9 years) from latest surgery. The system of evaluation according to the Constant Score indicated an average score of 78.4/100 at follow-up examination; UCLA indicated 27.2/35; ASES 99.6/120; ROWE 75.2/100. With regard to pain, the VAS Scale indicated an average score of 2.9/10. As criteria for relapse, we considered classic cases of dislocation and subluxations, or sprains with subluxation, and subjectively experienced apprehension and pain to a degree that seriously inhibited the patient's daily life. The incidence of relapse following the final surgical operation (taking into consideration both frank dislocations and subluxations) was 16.7%. At clinical revision, one patient showed dislocation due to relatively modest trauma ~1 year following the second surgery (5.6%). Episodes of subluxation or sprains continued in 2 shoulders (11.1% relapse). In 11 cases (61%), return to sports activities was achieved. Arthroscopy technique using anchors and sutures can, in selected cases, lead to satisfactory results, allowing, by means of minimal surgical invasion, identification and treatment also of intra-articular lesions, where associated.

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Introduction

Glenohumeral instability is a virtually intrinsic pathological condition of the shoulder, since its wide range of

mobility predisposes this joint to a somewhat precarious degree of stability. Several techniques have been described for the treatment of glenohumeral instability and each one poses its own, precise indications [1–5]. However, none of these techniques can definitively and optimally stabilize this joint [6–14]. The rate of recurrent instability after surgery varies between 0 and 30% depending on the authors, the nature of follow-up examination and the types of treatment used [13, 15, 16].

In reality, studies relating to capsulorrhaphy with staples, or Putti-Platt procedures report an incidence of relapse that is relatively high [11, 12], while studies referring to Latarjet or Bankart procedures report a percentage of relapse that is less than 11% [16–18].

As far as arthroscopy is concerned, the early reported percentage of recurrence is very high; this datum refers to techniques that are now merely of historical interest, such as trans-glenoidal suturing or arthroscopic staple capsulorrhaphy [16, 19, 20], while recurrence rate significantly improves with the current arthroscopic procedures using suture–anchors technique [21–23].

Through improvement of surgical techniques and performance instruments, as well as the increased awareness and experience of surgeons with regard to arthroscopy, most recent works clearly indicate that recurrence rates are similar between arthroscopical and open technique [15, 24–26].

Among the techniques that guarantee a very moderate level of recurrence (merely 3%), there is the Latarjet procedure that, while having a very low risk of recurrence, is not void of potential complications that may even be of greater entity such as mobilization or breakage of the screws, absorption of the bone block, glenohumeral arthrosis, infections and neurological or vascular lesions [6–8, 10, 27]. In some cases, the patient may suffer from persistent shoulder pain and/or a globally unstable joint, which would be termed a non-success rather than a complication in itself [6, 13, 17, 28, 29].

The aim of the study was twofold: on one hand, scope of our work was to report the results of surgical arthroscopical treatment, carried out in cases of failure of the Latarjet procedure; and second, we did evaluate the causes of failure of the primary surgery and the type of lesion identified in the diagnostic phase of the arthroscopy.

Materials and methods

In the period between January 2000 and June 2007, 17 patients (18 shoulders) came to our attention because of a failure of an open Latarjet procedure.

As criteria of failure, we considered classic dislocation, subluxations or subjectively experienced apprehension and

pain that gravely inhibited the activities of daily living of the patients.

All the patients had arthroscopic capsuloplasty surgery using the anchor and suture technique. All operations were performed by the same surgeon. The right-side joint was involved in 11 of the cases. Initial dislocation was of traumatic origin in all of the subjects.

We considered the following parameters: age of the patient at the time of the first dislocation, at the time of the first surgical procedure and revision; the number of dislocations and nature of the former, both concerning the first episode and following the first surgical stabilization treatment; the time elapsed between the primary dislocation and the first surgery; the type of lesion observed on imaging of the primary surgical procedure and that observed arthroscopically at the time of recurrence; the type of treatment administered as a result of the first dislocation; the type of rehabilitation carried out post-operatively; clinical and functional aspect of the contralateral joint; clinical condition at follow-up examination with regard to the Constant scale, ROWE, UCLA, VAS, ASES and return to sports and working activities.

The 17 patients (18 shoulders) were re-examined clinically by one physician at an average follow-up period of 5 years 9 months (min. 2 years–max. 9 years).

All patients had undergone the Latarjet procedure elsewhere. The average age at the time of the first dislocation was 20 years (min. 13 years–max. 38 years; DS 6.7).

The number of traumatic dislocations prior to initial surgery averaged 6 episodes (min. 1–max 10; DS 12). The average age at the time of surgery was 26 years and 9 months (min. 16 years–max. 47 years; DS 8.6). The time elapsed between the primary episode of dislocation and the manifestation of symptoms and initial surgery was on average 5 years and 7 months (min. 1 year–max. 16 years; DS 7.75). The mean age at the time of revision surgery was 33 years and 5 months (min. 20 years–max. 53 years; DS 10.6).

The sling used following primary surgery was maintained for an average period of 28 days (min. 26 days–max. 36 days; DS 8.89). As far as failure following primary surgery was concerned, we observed: one case of recurrent dislocation that ensued ~1 year later due to trauma in 10 cases (58.8%) and mild trauma in 6 cases (35.3%). In another case (5.9%), however, subluxations and pain were experienced that were not of traumatic origin.

The average time elapsed between primary surgery and successive surgery was 6 years and 9 months (min. 1 year–max. 28 years; DS 6.08).

Moreover, two subjects underwent other surgical procedures prior to requesting our care. In particular, one patient had undergone unspecified open surgery involving

capsular plication, 3 years previous to the cited Latarjet procedure. Another patient was treated with arthroscopic shrinkage 4 years after the Latarjet procedure.

The second surgical operation was carried out after an average of 5 dislocations (min. 1–max. 6 (DS 1.8; or numerous subluxations) following primary surgery.

At the time of re-operation, we observed in 6 cases the absence of an anterior labrum for effect of the Latarjet procedure; in 2 cases, this finding was associated with SLAP lesion; in 9 cases, this finding was associated with capsular laxity; in 1 case, the absence of the anterior labrum due to the Latarjet operation was associated with a SLAP lesion and a clear ligamentous elongation. Indication for arthroscopic treatment was suggested due to negative pre-operative imaging of significant bony deficit on the glenoid [30].

During revision arthroscopy, there was clear presence of degenerative arthritis on the glenoid and humeral surface in just one case.

Arthroscopic surgery consisted of capsulorrhaphy using anchor and suture technique in 9 cases, one case consisted of repair of the SLAP lesion and multiple capsular plications; in another case, capsulorrhaphy and repair of the SLAP lesion; while for the remaining 7 cases, multiple plications were associated with arthroscopic capsulorrhaphy. In one case, we removed the already mobilized screw and washer during arthroscopy.

Post-operative protocol following revision arthroscopy included the use of a sling for an average of 29 days (min. 27 days–max. 38 days), and prescribed removal of it for ~1 h a day, performing mild pendulum exercises. After removal of the sling, passive mobilization was performed, taking steps to avoid forced abduction and external rotation of the upper limb involved; active mobilization exercises were commenced 2 months later. Rehabilitation then proceeded with gradual recuperation of muscle strength of internal and external rotators. Return to agonistic or contact sports was allowed from 6 months on.

Results

No intra-operative or post-operative complications were registered for any of the patients enrolled in this study. There were no cases of anchor mobilization, or intolerance of the former.

With regard to assessment using the Constant system, average score at follow-up examination was 78.4/100 (min. 40–max. 100; DS 16.2); for UCLA, the average score was 27.2/35 (min. 10–max. 35; DS 6.9); for ASES, the average score was 99.6/120 (min. 73–max. 120; DS 14.7); the ROWE score produced 75.2/100 (min.–max. 100; DS

25.3); while the VAS score for pain assessment presented with an average value of 2.9/10 (min. 0–max. 9; DS 3.7).

The results relating to ROWE score were good or excellent in 66.7%, giving rise to values equivalent or greater than 75/100.

At the time of follow-up, we registered 3 cases of recurrence (16.7%). In particular, one patient confirmed sustaining dislocation due to relatively mild trauma ~2 years following the second surgery. This patient had undergone arthroscopic capsuloplasty with three Panalok™ (De Puy-Mitek Inc., Raynham, MA, USA) anchors and plication of the rotator interval. Two patients reported episodes of subluxation or spraining (11.1% recurrence). One patient who presented with subluxation at clinical revision had undergone arthroscopic capsuloplasty with two miniRevo™ (Linvatec Co, Largo, FL, USA) titanium screws and plication of the rotator interval; the other one, after having undergone our revision arthroscopy with a Panalok™ anchor, sustained two further surgeries elsewhere (open resection of the distal third of the clavicle and arthroscopic shaving). In 11 cases (61%), a return to previous sports and working activities was recorded. Table 1 resumes the main features of patients enrolled in this study.

Discussion

Our results showed 16.7% recurrent instability following recovery from arthroscopy. One patient dislocated for a relatively mild trauma (5.6%) and two patients presented with an unstable shoulder prone to subluxations, not of traumatic origin (11.1%).

The causes of recurrence can be different and according to Hawkins [31], they can depend on various factors such as an incorrect initial diagnosis, intra-operative technical problems (un-repaired Bankart lesion, erroneous positioning of screws or anchors), overly aggressive rehabilitation, biological factors such as excessive laxity of the subject and last but not least, new trauma [29, 32]. According to some authors, the majority of causes relating to recurrence can be attributed to diagnostic error, underestimation of capsular laxity and non-recognition of the multidirectional instability [32]. The Latarjet procedure has shown a very low recurrence rate, but can present significant complications such as neurological or vascular lesions [8], mobilization or breakage of screws, absorption or non-union of the bone block, glenohumeral arthritis, infections, fat degeneration of the subscapularis due to iatrogenic damage [6–8, 10, 27], as well as the persistence of pain in some cases [6, 13, 17, 28, 29]. When performing this particular technique, splitting of the subscapularis so as not to denervate it and fixation of the coracoid to the anterior-

Table 1 The main features of the patients enrolled in this study are summarized

Patient	First surgery (age)	First dislocation	Dislocations before surgery (numbers)	First procedure	Recurrences before 2nd procedure (numbers)	Findings at 2nd surgery	Second Procedure	Feeling of patient after 2nd surgery	Rowe	Constant	VAS	UCLA	ASES	Return to sports and work
1	21 y	Trauma (Boxing)	Recurrent subluxation	Latarjet (1991)	After 6 months subluxations	Capsular elongation Absence of labrum	Arthroscopic Capsuloplasty with 2 suture-anchors (2000)	Painful shoulder	25	50	9	18	83	No sport
2	33 y	Fall	8 dislocations	Latarjet (1992)	1 dislocation (self reduction)	Absence of labrum SLAP II Hill-Sachs 2nd degree	Arthroscopic Capsuloplasty with 2 suture-anchors and SLAP repair (2000)	Satisfied	100	84	1	35	115	No sport but Ok
3	38 y	Fall	4 dislocations	Latarjet (1993)	5 dislocations first episode after 6 months from surgery without trauma	Good IGHL Hill-Sachs 3rd degree SLAP I; MGHL and SGHL not recognizable	Arthroscopic Capsulabral Reconstruction with 3 suture-anchors and 1 posteroinferior capsular plication	2 dislocations after last surgery without trauma	55	66	2	22	98	Ski
4	17 y	Playing soccer	2 dislocations	Latarjet and Putti-Platt (1994)	1 dislocation During match of soccer	Anterior labrum not recognizable Increased capsular volume	Arthroscopic Capsuloplasty with 2 suture-anchors and 1 posteroinferior capsular plication (2001)	Satisfied	100	96	0	35	117	Return work and sports
5	39 y	Trauma playing tennis	More than 20 subluxation	Latarjet (1999)	Shoulder sprain with minor trauma	Anterior labrum not recognizable Degenerative arthritis	Arthroscopic Capsuloplasty with 1 suture-anchor (2001)	Locking sensation of shoulder Subluxations Underwent 2 more surgery (distal clavicle resection; arthroscopic shaving)	35	40	9	10	73	Static work. Was a policemen in the past
6	30 y	Trauma at work	Many dislocations	Latarjet (1998)	5 dislocations the first after trauma	Not visible anterior labrum and capsular elongation	Arthroscopic Capsuloplasty with 2 suture-anchor and 2 posteroinferior plications (2002)	Painful	45	70	8	21	80	Return to heavy work but with pain

Table 1 continued

Patient	First surgery (age)	First dislocation	Dislocations before surgery (numbers)	First procedure	Recurrences before 2nd procedure (numbers)	Findings at 2nd surgery	Second Procedure	Feeling of patient after 2nd surgery	Rowe	Constant	VAS	UCLA	ASES	Return to sports and work
7	32 y	Trauma at work	1 dislocation	Latarjet (1999)	Apprehension during activities without dislocation	Not visible anterior labrum and capsular elongation	Arthroscopic Capsuloplasty with 2 suture-anchor and 2 posteroinferior plications (2002)	Painful	45	70	7	21	80	Return to heavy work but with pain
8	20 y	Karate	More than 10 dislocations	Latarjet (2000) after open surgery failure	1 dislocation after trauma during ski	Not visible anterior glenoid labrum	Arthroscopic Capsuloplasty with 2 suture-anchor (2003)	Satisfied	90	73	2	33	105	Return to the ski
9	21 y	Motor accident	Many dislocation self reduced	Latarjet (1999)	Instability (subluxation) without any trauma	Not visible anterior glenoid labrum	Shrinkage arthroscopy (2002)-Failed Capsuloplasty with 2 suture-anchor (2004)	Satisfied	100	95	0	29	100	Return to soccer, ski
10	20 y	Car accident	More than 3 dislocations	Latarjet (1999)	One dislocation playing tennis	Not visible anterior labrum and inferior capsular elongation	Arthroscopic Capsuloplasty with 1 suture-anchor (2003) and posterior release, block shaving	Apprehension and pain in some activities	80	72	7	24	107	No sport
11	47 y	Trauma during horse riding	5 dislocations always reduced at the hospital	Latarjet (2000)	One dislocation after minor trauma	Not visible anterior labrum and capsular elongation	Arthroscopic Capsuloplasty with 2 suture-anchor and 1 posteroinferior plication (2004)	Satisfied	80	83	0	32	101	Return to swim, ski, running
12	27 y	Trauma playing soccer	1 dislocation reduced at the hospital	Latarjet (1999)	Many subluxations without trauma	Not visible anterior labrum	Arthroscopic Capsuloplasty with 3 suture-anchor and 1 posteroinferior plication (2003)	Referred apprehension	80	95	0	31	100	No sports for other reasons

Table 1 continued

Patient	First surgery (age)	First dislocation	Dislocations before surgery (numbers)	First procedure	Recurrences before 2nd procedure (numbers)	Findings at 2nd surgery	Second Procedure	Feeling of patient after 2nd surgery	Rowe	Constant	VAS	UCLA	ASES	Return to sports and work
13	18 y	Subluxation while swimming Dislocation during cocking	3 dislocations and many dislocations	Latarjet (1999)	1 subluxation 1 dislocation for a trauma in abduction external rotation	Not visible anterior labrum and capsular elongation	Arthroscopic Capsuloplasty with 4 suture-anchors (2004)	Satisfied	100	72	0	31	103	Return to sports: soccer, ski
14	25 y	Important trauma	More than 5 dislocation	Latarjet (2001)	Subluxation playing tennis and then many subluxations	Not visible anterior labrum and posterior capsular elongation	Arthroscopic Capsuloplasty with 2 suture-anchors and 1 posteroinferior plication (2003)	Satisfied, but referred some feeling of apprehension during some activities	75	80	0	26	100	Return playing tennis
15	21 y	Trauma during boxing	More than 10 dislocations	Latarjet (2001)	One dislocation during boxing	Not visible anterior labrum and SLAP II	Arthroscopic Capsuloplasty with 2 suture-anchors and repair with suture-anchor for SLAP	Very satisfied	100	100	0	35	120	Return to boxe
16	35 y	No important trauma	4 dislocation reduced at hospital	Latarjet (2000)	After some months from surgery one dislocation falling down. Then many recurrent dislocations	Not visible anterior labrum	Arthroscopic Capsuloplasty with 3 suture-anchors	Stable shoulder but sometimes referred apprehension	55	80	7	24	80	Return to swimming
17	16 y	Motor accident	4 dislocation reduced at hospital	Latarjet (1996)	Pain and subluxation without any trauma	Not visible anterior labrum	Arthroscopic Capsuloplasty with 3 suture-anchors	Satisfied	90	90	0	33	115	Return to swimming
18	25 y	Motor accident	Many subluxations	Latarjet (1979)	Dislocation after an important trauma in 2006	Not visible anterior labrum. SLAP I Hill-Sachs 2nd degree	Arthroscopic Capsuloplasty with 3 suture-anchors and staple removal	Satisfied	98	95	0	30	115	Return to mountain climbing, weight lifting

inferior portion of the glenoid rim is thought to be beneficial [29, 33].

An incomplete or erroneous intra-operative assessment will inhibit repair of any associated lesions, such as the Bankart lesion, capsular elongation or the SLAP lesion that if not correctly repaired can provoke a new instability [34]. In our case study, at the time of re-operation, a SLAP lesion was identified and treated in 16.7% of the cases. Moreover, in no case was this lesion isolated.

Rowe, analysing 39 reconstruction failures in subjects with anterior instability carried out by means of various open surgery techniques (Bankart, Putti-Platt, Magnuson-Stack, Bristow-Latarjet, Dutoit, Nicola) described an unrecognized and therefore untreated Bankart lesion in 84% of the cases; excessive capsular laxity in 83% of cases; a Hills Sachs lesion in 76% of cases; an enlargement of the rotator interval in 20% of cases and 1 case of subscapular tendon breakage [29]. The percentage of hyperlaxity reaches 91% in Zabinski's work of 1999 [35], and 80% in Levine and Bigliani's work of 2000 [36]. In our case study, the percentage of capsulo-ligamentous elongation observed at the time of revision surgery was 62.5%.

With regard to the Bankart lesion, Bigliani found 46% of these lesions during re-operations [37], while for Zabinski, this particular item of data rose to 83%, closely resembling our equivalent findings that indicated 94% [35]. In our work, we observed that the most common lesion found during re-operation was the absence of the glenoid labrum in the anterior part of the glenoid for previous surgery. However, such a lesion was found to be associated with excessive capsulo-ligamentous lengthening in 56.3% of the patients.

The risk factors relating to post-operative relapse following arthroscopy are represented by young age (less than 20 years) [37, 38], ligamentous hyperlaxity [26, 37, 39], humeral or glenoid bone defect [26, 29, 32, 37, 39–42], contact sports [37, 39, 43], avulsion of glenohumeral ligaments from the humeral side [44, 45].

Technical errors during surgery (malpositioning of fixation means, non-valid suturing etc.) prevent resolution of the disease [29, 46].

Also, the low quality of tissue to be repaired can lead to surgical failure, even when the operative technique has been carried out correctly. The collagen fibrils of the capsule can elongate after multiple surgeries or dislocations [26, 35, 37, 39]. As a matter of fact, the number of dislocations, as well as the number of operations that the patient has undergone must be taken into consideration, since the capsular tissue in both cases exerts a reaction that produces an alteration of its biological characteristics; in the presence of ever-increasing scar tissue, there is an incidence of 17% relapse following the first stabilization surgery, while this statistic increases to 44% following

successive operations [38]. In our case study, the worst clinical results were found in those subjects who had undergone more than two surgical operations, or that showed associated signs of significant capsulo-ligamentous elongation.

The percentage of relapse after revision surgery was 16.7% in our case study. A similar statistic was produced by Kim, who reported 21% of relapse following re-operation and 4% relapse relating to initial procedures [40, 47], while results obtained by Neri were 27% relapse relating to repeated surgical procedures [48].

Causes of failure following revision arthroscopy are non-anatomical repair with lip fixed medially on the glenoid, contact sports [39, 47], an overly accelerated and incorrect rehabilitation regime, wear or breakage of materials (screws, staples, anchors etc.), capsular lengthening [37, 39].

Capsular lengthening was identified in 62.5% of repeat surgeries in our case study.

Finally, it is possible that a new trauma leading to the same disease, or generating a different type of instability can occur.

Many anatomic-pathological lesions observed during repeated surgery seem to be correlated to recurrent dislocation after the primary surgical operation.

Conclusions

The Latarjet procedure for the correction of instability is generally used in the presence of an anterior bone deficit of the glenoid. The long-term results are good if we consider the risk of recurrence that is generally low [1, 2, 4, 5]. However, often, as a result of serious trauma, the shoulder can be left in a state of global instability or pain [6, 13, 17, 28, 29, 49]. In these cases, the question that arises is what technique to apply, considering that the Latarjet procedure tends to determine significant subversion of the shoulder anatomy. Arthroscopy can be beneficial for these subjects and guarantees satisfactory results (21% failure following revision surgery) [47]. The data concerning relapse in our case study were quite low (16.7%). Since arthroscopic investigation allows easier identification of the intra-articular lesions, it is, in selected cases, the ideal technique to employ also because it is less invasive than traditional surgery and does not significantly alter normal anatomy. Moreover, arthroscopy guarantees fewer local and general complications when compared to those that can be generated in open surgical stabilization techniques [27]. In order to prevent failure of surgery for instability of the shoulder, it is necessary to start with a correct diagnosis and choose an appropriate surgical treatment. Correction of lesions identified intra-operatively (Slap, Bankart lesions) and

adequate capsular retention are basic criteria for a successful outcome of surgery for shoulder instability [34].

Conflict of interest None.

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