

Anterior shoulder instability: comparison between Latarjet open procedure and arthroscopic capsuloplasty

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Abstract. *Background:* Latarjet surgery and capsuloplasty are both valid alternatives for the treatment of anterior shoulder instability with limited glenoid bone loss, although in literature there is extensive discussion on it. The purpose of this study was to compare the outcomes of these procedures in patients with similar lesions. *Methods:* Between January 2000 to October 2020, 59 nonconsecutive patients suffering from anterior shoulder instability were treated, 33 had arthroscopic capsuloplasty (Group 1) and 26 had open Latarjet procedure (Group 2). The Group 1 was composed by 12% of female and 88% of males with the mean age at surgery 25.6 ± 9.07 (15–49 years). In the Group 2, the 100% of patients were males with mean age 32.42 ± 10.74 (16–56). Rowe Score, UCLA score and WOSI score were used to test patients. *Results:* Only UCLA (average was 22.18 ± 6.13 for the Capsuloplasty and 26.76 ± 6.57 in the Latarjet, $p = 0.01$) and ROWE scores (average was 70.15 ± 24.75 in Latarjet and 50.15 ± 24.70 in Capsuloplasty, $p = 0.002$) showed a statistically significant difference between the two procedures, while the WOSI (mean results of Latarjet 0.31 ± 0.16 against 0.24 ± 0.09 of the capsuloplasty, $p = 0.069$) there was no significant difference between the two groups in question. *Conclusions:* Apparently, the Latarjet surgery is better in terms of instability recurrence compared to capsuloplasty but has higher rate of shoulder joint osteoarthritis. However, there are no significant differences that could decree which procedure is better. (www.actabiomedica.it)

Key words: shoulder instability, shoulder dislocation, Latarjet surgery, capsuloplasty

Introduction

The glenohumeral joint is unconstrained compared with many other joints in the human body to accommodate a large range of motion (1): this is one of the contributing causes of an inherently unstable joint whose balance relies on the interaction of many dynamic and static stabilizers. A damage or incorrect development of any of these anatomical structures may result in instability, pain, and a loss of function. (2)

Innumerable classifications have been developed over the years to describe glenohumeral instability. Nevertheless no system has gained universal acceptance. (3)

Laxity and hyperlaxity must be distinguished from instability that is defined as a loss of centring ability during shoulder activity associated with symptoms such as pain, apprehension or discomfort.⁴

From an etiopathogenetic point of view we can distinguish various causes of shoulder instability.

Among congenital causes, we can mention inadequate glenoid concavity, glenoid hypoplasia, muscular imbalance or a lack of neuromuscular control; other less common inherited causes are collagen disorders such as the Ehlers-Danlos syndrome. (4)

Shoulder instability can also occur as a consequence of traumatic and microtraumatic events that can progressively lead to the development of pain and lead to instability.

Traumatic dislocation of the shoulder is a relatively common injury in the young and active population and it is related to the 90% of the glenohumeral instability (approximately 1% to 2% of the general population will experience a glenohumeral dislocation in their lifetime). (5)

Young and athletic people are particularly susceptible to shoulder instability events and sport injuries represent about 60% of glenohumeral trauma. Over 95% of shoulder instability events occur in the anterior direction. (6)

Chronic anterior shoulder dislocation is commonly associated with several associated injuries, such as an Hill-Sachs or a Bankart lesion, a glenoid fracture, a massive glenoid bone loss, a rotator cuff tears or proximal humeral fractures. (7-8)

Many classification systems of shoulder are based on the etiology (traumatic vs atraumatic), on the direction of the dislocation (unidirectional or multi-directional), the presence of generalized ligament laxity, or the presence of voluntary instability but no system has gained universal acceptance. (3)

Indeed, shoulder instability may be classified into Traumatic, Unidirectional instability and Bankart lesion (TUBS) which often requires Surgery, and Atraumatic, Multidirectional, Bilateral Instability (AMBRI). AMBRI generally has better outcomes with a conservative treatment based on rehabilitation. (9)

The two main surgical procedures classically performed to treat chronic anterior shoulder instability with significant Hill-Sachs lesion are the Latarjet procedure and the arthroscopic Bankart repair: which is the optimal technique remains debated in literature. (9)

The aim of this work is to compare the result of these two surgical procedures in terms of post-operative pain, surgical relapses, personal satisfaction of the patients and return to sport in patients with a glenoid bone loss lower than 25%.

Material and methods

Between January 2000 to October 2020, 147 consecutive patients suffering from shoulder instability secondary to recurrent shoulder dislocation were treated at the Orthopedic Clinic, Verona University.

Among these, 81 patients underwent arthroscopic capsuloplasty while 66 patients the open Latarjet procedure.

In the study were included patients diagnosed with shoulder instability due to recurrent dislocation with a glenoid bone loss lower than 25% verified by Computed Tomography, while those who did not answer or did not agree to participate were excluded. At last 59 patients were enrolled, among these, 33 had undergone capsuloplasty (Group 1) and 26 had undergone Latarjet procedure (Group 2). Informed consent was obtained from all of them and other conservative treatments had failed in all patients.

The post-operative course after Latarjet procedure involves the use of shoulder brace in neutral rotation at 10-15 degrees of abduction for about 1 month. At 3-4 weeks the patient can begin assisted active physiotherapy and the gradual resumption of common daily activities. On the other hand, for capsuloplasty, the post-surgical treatment consists of immobilization with a brace that blocks the joint in adduction and internal rotation with the elbow flexed for about 4 weeks. When the brace is removed, it is advisable to start with physical therapies and exercises of passive and assisted mobilization gradually, avoiding extreme degrees of flexion, abduction and extra-rotation.

The capsuloplasty group was composed by 4 females (12%) and 29 males (88%). In Latarjet group all 26 patients were males (100%).

The mean age at surgery for the first group was 25.6 +/- 9.07 (15-49 years) while for the second group was 32.42 +/- 10.74 (16-56).

In the capsuloplasty group 23 operated shoulders were right (69.7%) and 10 were left (30.3%). In the Latarjet group 14 operated shoulders were right (53.8%) and 12 left (46.2%) (table 2).

The mean follow-up interval in the capsuloplasty group was 66.51 months +/- 37.42 (11-192 months) and 108.35 +/- 72.77 months in the Latarjet group (11-252 months).

Rowe Score, University of California at Los Angeles Shoulder Score (UCLA score) and Western Ontario Shoulder Instability Score (WOSI score) were used to test patients.

Rowe Score was originally designed for the post-operative assessment of Bankart Shoulder Repair

Procedure. In our study we also used it for Latarjet procedure since it allows assessment of recurrent dislocation after surgery.

The UCLA Score was originally designed for the evaluation of outcomes after shoulder arthroplasty but was later used for other specific situations, such as following treatment for rotator cuff disease or shoulder instability.

The WOSI Score was developed to assess postoperative outcomes in patients with shoulder instability and is particularly suitable for a long term evaluation (10-11).

Eight patients who had undergone Latarjet procedure were also submitted to radiographic study to assess the degree of postoperative osteoarthritis.

Response to treatment was statistically evaluated using paired Student's t-test for quantitative variables; results were considered significant when the p values were less than 0.05.

The ethics committee was not questioned for this type of study.

Results

Rowe scores in the Latarjet group were 9 (35%) excellent, 8 (31%) good, 5 (19%) fair, 4 (15%) poor; while in the capsuloplasty group the results were: 3 (10%) excellent, 5 (15%) good, 13 (39%) fair, 12 (36%) poor. With an average of 70.15 ± 24.75 in Latarjet and 50.15 ± 24.70 in Capsuloplasty.

The UCLA scores for the Latarjet group the results were: 3 (12%) excellent, 10 (38%) good, 9 (35%) fair and 4 (15%) poor; while in the capsuloplasty group were 0 (0%) excellent, 7 (21%) good, 11 (33%) fair and 15 (46%) poor. With an average of 26.76 ± 6.57 in the Latarjet and 22.18 ± 6.13 for the capsuloplasty.

The mean of the WOSI scores of the Latarjet group was 31 ± 16 against 24 ± 9 of the capsuloplasty one. In the "Physical Symptoms" section an average score of 3 ± 16 was obtained for Latarjet and 22 ± 10 in capsuloplasty; in the section "Sport, Recreational Activities and Work" an average score of 36 ± 22 was obtained for Latarjet and 29 ± 12 for capsuloplasty; in the "Lifestyle" section an average score of 3 ± 18 was obtained for Latarjet and 22 ± 12 for capsuloplasty; in

the "Emotions" section an average score of 35 ± 3 was obtained for Latarjet and 32 ± 2 for capsuloplasty.

A T test was carried out for all scores to verify whether the mean value of the two groups differs statistically. For the Rowe and UCLA scores of the two groups the difference was statistically relevant with $p < 0.05$ (p-value = 0.002 and 0.01 respectively). The WOSI scores, on the other hand, were statistically not different between the two groups (p-value = 0.069) even if the p-value is slightly above the predetermined level of significance.

Patients who had episodes of dislocation at the last follow-up were greater in the capsuloplasty group than in the Latarjet group, 15,15% (5/33) and 7.7% (2/26) respectively while instability following surgery was 18.2% (6/33) after capsuloplasty and 11.5% (3/26) after Latarjet procedure. To establish a possible superiority of one of the two techniques in terms of recurrence of dislocation or instability, a Chi-square test was performed obtaining $p > 0.05$. Therefore, the difference between the two techniques in terms of recurrence was not statistically significant.

In patients undergoing Latarjet surgery, 7 have previously undergone an arthroscopic capsuloplasty while only one patient underwent a second surgery for resorption of the bone block.

Of the 8 radiographs available after Latarjet surgery, 3 showed arthritis.

Discussion

Bankart arthroscopic capsuloplasty and Latarjet open bone transposition are procedures widely established in literature for recurrent anterior shoulder dislocation.

In literature it has been widely demonstrated that a glenoid bone loss greater than 25% makes capsuloplasty surgery not indicated due to the high rate of recurrency (12-13-14) while good efficacy is reported both for capsuloplasty and for bone block surgery for glenoid deficiency lower than 25%. Furthermore, the risk of postoperative dislocation after arthroscopic Bankart repair increases significantly for patients with more than 3 preoperative dislocations. In these cases, the surgical treatment remains debated and

so the choice depends on the surgeon's preferences. (15-16-17-18)

French shoulder surgeons prefer to treat those anterior shoulder instability with Latarjet surgery, while arthroscopic capsuloplasty is widespread in the rest of the world (19). In particular, 72% of French surgeons use the Latarjet procedure as the first intervention in patients with shoulder instability, while 90% of international surgeons prefer Bankart capsuloplasty as first approach. (20-21)

In literature recurrency rates are highly variable for the two procedures: from 0% to 30% for Bankart capsuloplasty (mean 9%)(22-23), while from 2% to 14% (mean 7%) for Latarjet procedure. (24-25) In this study, 5 patients underwent Latarjet surgery after capsuloplasty following recurrence of instability.

According to literature, there is a higher incidence of anterior glenohumeral joint instability episodes in young patients, probably due to the practice of risky activities such as contact sports. (2-10) In this study the prevalence of surgery for shoulder instability was higher in male population (88% of capsuloplasty and 100% of Latarjets) than in females (12% of capsuloplasty and 0% of Latarjets) and the mean age at surgery was 25.6 ± 9.07 for the capsuloplasty group while it was 32.42 ± 10.74 for the Latarjet group. The age difference in the two groups reflects the tendency of many shoulder surgeons to manage an initial diagnosis of instability conservatively or with capsuloplasty and only after new episodes to perform Latarjet procedure. (26-27)

Comparing the Rowe scores, the efficacy is greater for Latarjet group than for arthroscopic capsuloplasty one (mean Rowe score 70.15 ± 24 , $75 \pm 50.15 \pm 24.70$, $p = 0.002$) in line with what is reported in the literature. (28) This score is strongly influenced by the stability of the joint and the return to normal functionality of the shoulder.

So, these results in Rowe scores might be explained by the different incidence of recurrent instability that were 6/33 (15,15%) in the capsuloplasty group and 3/26 (11,5%) in the Latarjet group ($p > 0,05$). These data are in line with those in literature. (20)

Mean UCLA scores were slightly higher in Latarjet patients than in Capsuloplasty patients (26.76 ± 6.57 vs 22.18 ± 6.13 , $p = 0.01$). None of the patients in the capsuloplasty group scored excellent and most

(26 patients) had poor or moderate results. Using the WOSI score, better results were obtained in the capsuloplasty group than in the Latarjet group (0.24 ± 0.09 vs 0.31 ± 0.16 , $p = 0.069$). Similarly, all sections of the test (physical symptoms; sports, recreational activities, work; lifestyle; emotions) on average showed slightly higher scores in capsuloplasty than in Latarjet group. These data may reflect a greater loss in mobility after Latarjet surgery and a later resumption of physical activity compared to arthroscopic capsuloplasty. (28-29) However, the results of the tests did not reveal a statistically significant difference between the two procedures. In addition, patients who have undergone arthroscopic capsuloplasty are on average younger (25.6 years) than patients who have undergone Latarjet (32.42 years) and this can influence a tendency to return to competitive sports in the first group.

The Latarjet technique therefore offers a lower rate of recurrence of dislocation and instability but is more invasive, requires a longer rehabilitation, show a decrease in the shoulder range of motion and a longer time to return to sport activities. Biomechanical studies have shown that the effectiveness of this surgery is due to a triple effect: increasing in the glenoid surface, repairing of the capsule and the sling effect given by the conjoint tendon. (30)

Our results show no statistically significant difference between the two types of procedures in terms of instability recurrence, therefore we can assume that both procedures can be considered valid alternatives in patients with glenoid bone loss inferior to 25%.

A well-known complication of Latarjet's surgery is the development of postoperative osteoarthritis. In our study, 3 of the 8 patients who underwent radiological follow-up, had signs of osteoarthritis, however all patients with a history of shoulder instability are prone to develop it. Furthermore, in literature there is no significant difference in the development of this complication in patients treated with capsuloplasty and Latarjet. (20-31-32)

To improve the outcomes of the arthroscopic capsuloplasty in terms of dislocation recurrence numerous accessory techniques have been proposed: remplissage, the A.S.A. technique and the D.A.S. technique. On the other side, to reduce the Latarjet procedure invasiveness, an arthroscopic technique was developed. For

these the newly developed techniques results in the long term are missing, but they show promising results in the short term.

The study is a non-randomized retrospective investigation and this is the major limitation. A medium-long term follow-up, standardized surgical techniques and a sample size consistent with the studies in the literature are the advantages of this study. It would be of great interest to perform a randomized clinical trial with physical examination of the shoulder at fixed time points to confirm our data.

Conclusion

It is mandatory to carefully explain to the patients risks and benefits of both procedures, underlining that the arthroscopic procedure is less invasive but has a higher recurrence rate, as confirmed by the literature, whereas the Latarjet bone transposition is more invasive, it shows a longer recovery time but confers greater stability to the joint and a higher satisfaction rate among patients.

In conclusion we can state that, to treat chronic anterior shoulder instability with limited glenoid bone loss, both arthroscopic Bankart repair and the Latarjet procedure yield good results in terms of patient satisfaction and time to return to activity, but it is fundamental to carefully select the patients in term of the type of lesion and of patient's functional request.

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

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