Treatment of Anterior Instability of the Shoulder

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ABSTRACT

Objectives: The aim of this study is to compare the long term results of the treatment of anterior instability of the shoulder.

Material and method: The study included a total of 37 patients diagnosed with anterior instability of the shoulder, on the basis of clinical data (anamnesis, physical examination) and imaging (X-rays, MRI examination), operated in the Department of Orthopedics and Traumatology – Emergency University Hospital Bucharest, Romania, between 2009-2012. They were divided in 3 groups, according to the surgical technique used (open Bankart, arthroscopic Bankart and Bristow procedure), and the results were evaluated at 2 years postoperatively using Rowe and Constant scores. Statistical analysis was performed using one-way ANOVA test.

Results: There were no intra- or postoperative complications. No reluxations were recorded. Statistically significant differences (F>Fcrit; p<0.05) of the Constant score were recorded between the three groups on the range of movement variable, especially external rotation, their mean values being higher in the group treated arthroscopically compared to the other two groups.

Conclusions: Arthroscopic shoulder stabilization surgery gives the best long time results in terms of functional recovery of the shoulder, objectified by Constant and Rowe scores. Data from the literature show a higher rate of recurrence after arthroscopic interventions, suggesting that the indications of this technique still require further clarifications. It’s required a more precise preoperative evaluation, in order to detect any lesions associated with Bankart lesion (bone defects of the anterior rim of glenoid, Hill-Sachs lesion, capsular laxity, rotator cuff tears, long head of biceps injuries). Mastering a surgical technique is not always enough in order to obtain the best results. The choice of proper surgical technique for each patient, however, can significantly reduce the recurrence rate of shoulder dislocation.

Keywords: anterior instability of the shoulder, Bankart lesion, shoulder arthroscopy
INTRODUCTION

Glenohumeral articulation is, from an anatomical and biomechanical point of view, the most mobile joint of the body, but also one of the most unstable and frequently dislocated joint, accounting for almost 50% of all dislocations. Dislocation of the shoulder has been described since the 2500-3000 years BC in “Edwin Smith” scrolls and paintings in the Egyptian tomb of Ipuy (1200 BC) suggests what was later described as a method Kocher of reduction of glenohumeral dislocation (Hussein, 1968). Later, Hippocrates describes in detail the pathology and treatment of acute and chronic shoulder dislocation. Hippocrates technique to reduce glenohumeral dislocation appears in the book Peri Arthron written by Apollonius of Kition (Larnaca today) between 81-58 BC and, little altered, is still in use today.

The incidence of shoulder instability in the general population is relatively high - 1.7% (according to Danish registry). This percentage is doubled (2.8%) when referring to young, active people. Of these, 85% have a history of trauma and 90% of dislocations are anterior because external rotation and abduction, very common in many contact sports, positions the shoulder in an extremely vulnerable position. Extremely high rate of recurrent dislocation (between 20 and 50%) occurring in 90% of young people who have suffered a first episode of dislocation, is an element of concern about the impact on patient quality of life and treatment efficiency of the primary event (1-3). Controversies still exist on therapeutic methods, an algorithm for the treatment of shoulder dislocation is not currently universally accepted.

MATERIALS AND METHODS

The study included 37 patients treated in the Department of Orthopedics and Traumatology – Emergency University Hospital Bucharest, Romania between 2009-2012 for shoulder instability secondary to trauma. Patients were examined by the same physician at 2 years postoperatively, and clinical examination results were evaluated using the Rowe and Constant scores. Patients were divided into three groups depending on the surgical procedure performed: the first group included 14 patients who underwent arthroscopic Bankart repair, the second group included 12 patients who underwent open Bankart procedure and in the third group were included patients who underwent Bristow procedure (11 patients). The three groups were homogeneous in terms of age, gender, dominant member, number of dislocations, time elapsed since the first episode of dislocation and surgery (Table 1).

Preoperative examination consisted of performing the specific clinical tests for this pathology (drawer sign, subacromial sulcus sign test, apprehension and relocation test), radiological examination (anteroposterior and axillary incidence) and MRI. Preoperative assessment of the health status of patients was assessed by laboratory tests (blood count, coagulation, biochemistry), biological constants and EKG. Surgeries were performed under general anesthesia with oro-tracheal intubation. Arthroscopic stabilization was performed with the patient supine, the surgical table in the “beach-chair” position; three portals were practiced (posterior, anterior rotator interval portal and anterior trans-subscapular portal) and a throughout evaluation of intra-articular lesions was performed (presence of Bankart lesion, assessment of glenohumeral ligaments integrity, any Hill-Sachs lesions or other joint injuries, biceps tendon integrity, rotator cuff muscle integrity). Glenoid labral reinsertion was performed with metal anchors (Arthrex FASTak™) or absorbable anchors (Bio-FASTak™ by Arthrex) placed at 3, 5 and in some cases at 7 o’clock. The nodes were tightened from the lower anchor first. Capsular shift were performed in case of capsular laxity.

<table>
<thead>
<tr>
<th>GROUP 1 -arthroscopic-</th>
<th>GROUP 2 -open Bankart-</th>
<th>GROUP 3 -Bristow-</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>Mean age</td>
<td>27.2 (20-34)</td>
<td>27.4 (22-36)</td>
</tr>
<tr>
<td>Gender</td>
<td>m=12; f=2</td>
<td>m=11; f=1</td>
</tr>
<tr>
<td>Dominant arm</td>
<td>12</td>
<td>12</td>
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<tr>
<td>Number of dislocations</td>
<td>1-4: 10 patients</td>
<td>1-4: 10</td>
</tr>
<tr>
<td></td>
<td>4-9: 4</td>
<td>4-9: 1</td>
</tr>
<tr>
<td></td>
<td>&gt;10: 0</td>
<td>&gt;10: 1</td>
</tr>
<tr>
<td>Mean time from</td>
<td>24.6 (8-50)</td>
<td>22.6 (6-48)</td>
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<td>first dislocation to</td>
<td></td>
<td></td>
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<tr>
<td>surgery, months (range)</td>
<td></td>
<td></td>
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<tr>
<td>Mean age at first</td>
<td>23.2 (18-32)</td>
<td>23.4 (20-34)</td>
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<tr>
<td>dislocation, years</td>
<td></td>
<td></td>
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<tr>
<td>(range)</td>
<td></td>
<td></td>
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<tr>
<td>No. of patients</td>
<td>14</td>
<td>11</td>
</tr>
<tr>
<td>involved in sport</td>
<td></td>
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<tr>
<td>activities</td>
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TABLE 1. Demographics of the patient population.
The open procedures (Bankart and Bristow procedures) were also performed with the patient in the “beach-chair position” with a sand bag under respective scapula in order to lift the chest, through an anterior deltopectoral approach. Bankart labral reinsertion was performed with metal anchors carrying non-resorbable suture and the coracoid tip fixation to the anterior border of the scapula in Bristow operation was performed with a 4.5 mm malleolar screw (Figures 1, 2).

Postoperatively, all patients were immobilized in shoulder brace in 20° flexion and 30° abduction for 45 days. After 21 days all patients began passive exercises and assisted range of motion exercises to recover mobility; external rotation was not permitted for 45 days. The return to sports activity was allowed after six months postoperatively.

The long term evaluation was performed at two years postoperatively. Patients were examined in terms of complications, shoulder function, level of activity and stability. For objective analysis the data were recorded using the Constant and Rowe scores and statistical significance of the results was verified by one-way ANOVA test.

RESULTS

There were no intra- or postoperative complications recorded. Patients were evaluated at baseline and at an interval of two years postoperatively. No relaxations were recorded in any group. Constant score improvement was found in all three groups, more pronounced in the arthroscopy group, but without statistical significance (F<F<crit; p=0.7937) (Figure 3).

There were differences in the parameter “mobility” of the Constant score between patients in the first group (arthroscopy) and the other two, mainly due to a decrease in external rotation in patients in groups 2 and 3 (open Bankart and Bristow). Data analysis using one-way ANOVA test for external rotation showed F(3.381694) >F<crit(3.275898) and p=0.045766, values considered statistically significant (Figure 4). With regard to local pain there were not recorded statistically significant differences (p>0.05) between the two groups.

ROWE score (stability) also reported differences between the three groups of patients in terms of the variable “mobility”, but the data were not statistically significant (p=0.067); This may be due to the difference in measurement of this parameter between the two systems (Constant - maximum 40 points; ROWE - maximum 10).

We also recorded a difference regarding the mean value of external rotation between group 2 (open Bankart) and group 3 (Bristow), although without statistical significance (p=0.357).

DISCUSSION AND CONCLUSION

Shoulder instability is an etiopathogenetic complex ranging from simple laxity to pure dislo-
cation. The causes are multiple, and often combined: disruption of anteroinferior glenoid labral insertion (Bankart lesion) capsulo-ligament laxity, bone defects (edge of the glenoid, proximal humerus - Hill-Sachs lesion) and muscle injuries (rotator cuff rupture, long head of biceps injury). The introduction of shoulder arthroscopy (1980) increased the detection accuracy of associated lesions and allowed a better understanding of the biomechanics of the shoulder instability and the etiology of correlations between clinical symptoms and anatomical lesions. Arthroscopic treatment of anterior shoulder instability brings a number of advantages compared with open procedures: short surgery time, lower complication rate, less postoperative pain, shorter hospital stay, aesthetic postoperative scar. Disadvantages of this procedure include a higher rate of relaxation, expensive equipment and mastering a complex surgical techniques, with a long learning curve. Also, some studies show superior results compared to open procedures regarding postoperative mobility of the shoulder. The higher rate of recurrence after arthroscopic repair indicates the need to establish more precise criteria on indications of this extremely useful procedure in the treatment of shoulder instability (3).

Open Bankart repair described and popularized by Rowe et al. (Rowe CR, Patel D, Southmayd WW. The Bankart procedure: a long-term end-result study. J Bone Joint Surg Am 1978;60:1-16), is considered to be the best procedure to treat shoulder instability. Positioning anchors at the bottom of the leading edge of the glenoid (anteroinferior glenohumeral ligament marking area) gives the best technique for repair of a Bankart lesion in terms of anatomical criteria and recurrence rates. Concomitant presence of ligamentous laxity requires capsular shift procedures (4).

Latarjet procedure was first described by a French surgeon Michel Latarjet, 1954; Similar procedures were carried out in the UK (Bristow procedure) and in Russia (Boytchev process). The technique involves transfer of the coracoid tip with muscle insertions at the anterior border of the glenoid and securing it with a screw. This replaces the glenoid bone defect and transferred muscles acts as a barrier, preventing further dislocations. The procedure has a high success rate due to triple effect described by Didier Patte (1933-1989): 1. Restoring or increasing contact area of glenoid; 2. The conjoint tendon acts as stabilizer of the joint in abduction and external rotation due to reinforcement of the subscapularis and anteroinferior capsule; 3. Repair of the joint capsule. This triple effect of Latarjet-Bristow procedure provides excellent results in the treatment of anterior shoulder instability (5). In this retrospective study we compared the long term results of the treatment of anterior instability of the shoulder using the three surgical procedures previously described – arthroscopic Bankart repair, open Bankart and Bristow technique.

Our results resembles with existing data in the literature (6,7). There is still no consensus on long-term results of arthroscopic surgery for anterior shoulder instability. Being a relatively new surgical technique are still necessary studies on larger groups of patients, followed over a longer period of time, in order to establish a therapeutic protocol for anterior shoulder instability. The reduced length of stay and de-
creased rate of complications, made arthroscopy superior to open procedures in terms of costs. The outcome evaluation show significant differences between the 3 groups for range of motion variable, especially the external rotation value, which had a significantly greater mean value in the arthroscopic group according to the Constant scoring system, especially External rotation deficit that is recorded with greater frequency after open procedures largely is due to surgical approach that need to section the joint capsule and the subscapular muscle in the open Bankart procedure. That explain why we found differences between open Bankart and Bristow procedures regarding the external rotation, which had a greater mean value in the Bristow group according to the Constant scoring system. Overall, the loss of external rotation seems higher in the open Bankart group. Although arthroscopic repair of a Bankart lesion is in our opinion „a gold standard” procedure, previous clinical studies (8) further indicates the presence of a higher rate of recurrence after arthroscopic procedures versus open procedures (13.5% versus 11%); this is maybe due to the fact that arthroscopic procedures indication are pushed beyond the technical possibilities of the method, the presence of associated bone lesions (defects of the anterior edge of the glenoid, Hill-Sachs lesion >5 mm) having, in our opinion, an absolute indication for open surgery.

Conflict of interests: none declared.
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REFERENCES