

# Arthroscopic Management of Anterior Instability of the Shoulder

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## SUMMARY

**Background.** The aim of all shoulder joint stabilization surgery is to prevent further dislocation and restore anatomical continuity of the capsule-labral complex to the anterior and inferior edge of the glenoid. In this study, the authors analyzed the results of arthroscopic stabilization techniques using the method of suture anchors in patients with recurrent anterior shoulder instability.

**Material and methods.** During the reporting period they performed surgery on 91 patients with anterior shoulder instability using the method of MITEK GII suture anchors and BIO ANCHOR . The group consisted of 19 women and 72 men with a mean age of 28.6 years (range 16-70 years).

**Results.** In the preoperative evaluation, the mean Rowe score was 37.1 (range 15-55). Postoperatively there was a significant increase ( $p < 0.000$ ) in the score analysed using Rowe with a mean of 87.4 (range 45-100). When analyzing the results of operations, they evaluated the function as excellent in 65 patients (71.4 %) and 14 patients (15.4 %) were evaluated as good function. A satisfactory function was observed in 12 patients (13.2 %). For five patients, there was recurrence of instability of the shoulders.

**Conclusions.** Arthroscopic stabilization of post-traumatic shoulder instability using the suture anchor technique is the optimal solution for anterior shoulder instability. In conjunction with comprehensive treatment and subsequent rehabilitation an early return to the preoperative activities can be achieved with a reduction of residual restriction of shoulder movement.

**Key words:** shoulder instability, arthroscopy, stabilization

## BACKGROUND

Shoulder joint instability is the most common joint instability. In most cases, it is anterior dislocation, arising mainly following a fall on the shoulder of an abducted and extra-rotated upper extremity. Approximately ninety-five percent of anterior instability will be accompanied by damage of the antero-inferior capsulolabral complex. Despite immobilization, the risk of recurrent instability particularly among young people under 25 years of age may be up to 90 %. In cases where instability occurs repeatedly, despite complete physiotherapy and continues to cause discomfort and compromise to shoulder function, surgical treatment indicated. Despite the excellent results of the open Bankart's techniques which has a low percentage of relapses, there is an increasing interest in arthroscopic shoulder stabilization techniques as an alternative solution. Development of new arthroscopic fixation implants along with the ever-increasing operational experience and sophisticated rehabilitation programs allows for the improvement of surgical processes and thus better medical outcomes. It is hoped that arthroscopic stabilization of glenohumeral instability will become a routine technique for orthopedic work.

## MATERIAL AND METHODS

At the Orthopedic department of University Hospital in Nové Zámky and the one-day surgical clinic Mediklinik Levice we performed 723 shoulder joint arthroscopy procedures between December 2002 and May 2012 for various indications. Out of this number 91 patients were included in this study, who underwent arthroscopic stabilization surgery, that is – anterior fixation of capsulolabral complex due to post-traumatic instability.

Inclusion criteria included patients with recurrent traumatic instability of the anterior shoulder with post-traumatic instability of shoulders, who had no signs of generalized articular laxity and were without dislocation. On observation, we did not include patients with multidirectional instability, patients with glenoid bone defects, which was more than 20% of patients, large Hill – Sachs defect (engaging), which affects more than 30% of the articular surface of the humeral head and complete rupture of the rotator cuff.

Patients had a detailed examination and history taken, including patient's age, level of physical activity, details of the mechanism of first injury, recurrence, and how further episodes of instability have been managed.

The authors focused in the examination on the range of active and passive joint movement and in-

stability assessment using specific tests for instability. Part of the examinations were also clinical tests for shoulder impingement syndrome and for each of the tendons of the rotator cuff. Literature mentioned that the Hawkins test is most sensitive for the identification of shoulder impingement syndrome and the Neer test is the most specific one [3]. Diagnosis was made using a variety of imaging techniques, including standard AP and axillary projection to assess the shape and edge of the glenoid fossa. CT scans were used to assess the extent of bone defects of the glenoid and humeral head. The main task of the diagnostic arthroscopy was to confirm or exclude the presence of intra-articular pathologic changes and determine their extent to inform a subsequent decision about the type of surgical technique. The aim of surgical treatment of the instable shoulder was re-fixation of the labroligamentous complex to the anterior edge of the glenoid and the elimination of a pathological space between the anterior margin of glenoid and labrum, thus creating a stable and sufficiently mobile joint, which can return to a preaccidental level of function. We used the technique of arthroscopic fixation of the capsulolabral complex using a titanium dowels MITEK GII (Mitek, Norwood, Mass) or absorbable dowels BIO ANCHOR (Linvatec, Largo, Fl.).

We carried out the surgery with the patient positioned on their side with axial and lateral pulling of the limb. An initial diagnostic arthroscopy was performed using a standard approach. An upper front port was formed using the Inside – out technique. (Fig. 1).

Following detection of lesions on the anterior labrum and exclusion of mass lesions of the humeral head, glenoid and rotator cuff, we proceeded to the stabilization procedure (Fig. 2). Using a rasp we mobilized the capsulolabral complex from the front edge of the glenoid (Fig. 3) and debrided the labrum and the front edge of the glenoid with a shaver. Gradually we drilled 2-4 anchor holes into which we implanted titanium anchors MITEK GII (Mitek, Norwood, Mass.), or BIO ANCHOR absorbable anchors (Linvatec, Largo, and Fl.) (Fig. 4, 5), with single or double sutures. Using forceps, we caught the front labrum and inferior gleno-humeral ligament and re-fixed the labroligamentous complex to the anterior edge of the glenoid, thus we reduced the pathological front space (Fig. 6, 7, 8).

Postoperatively we fixed the shoulder with Desault's bandage for five weeks, followed by physiotherapy aimed at progressively increasing the range of motion and strength. For 3 months after the operation, we did not encourage external rotation with



Fig. 1. Position of patient

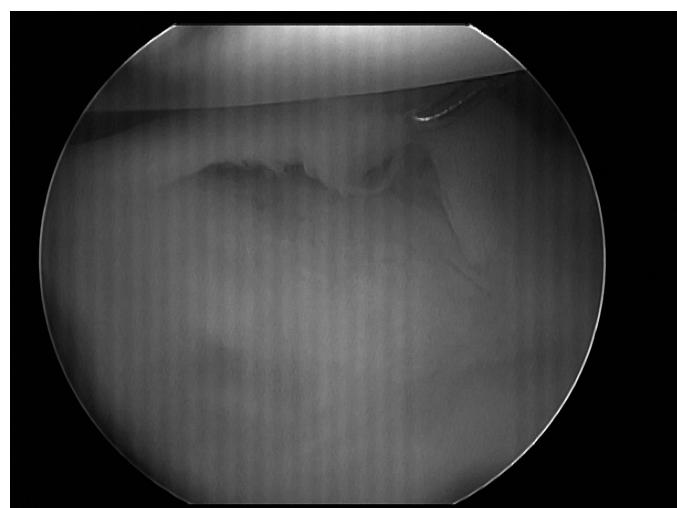


Fig. 2. Bankart lesion

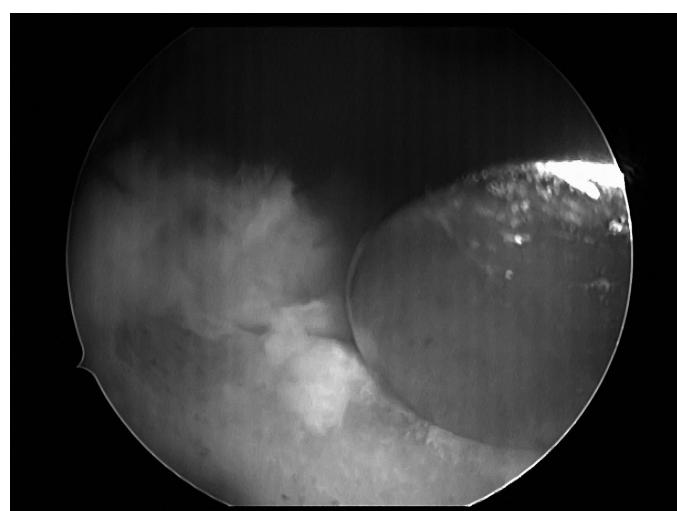


Fig. 3. Labrum mobilization

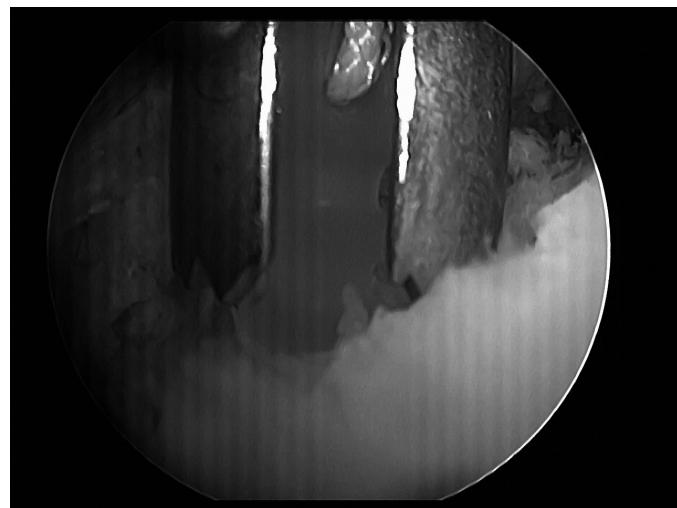


Fig. 4. Insertion of anchors

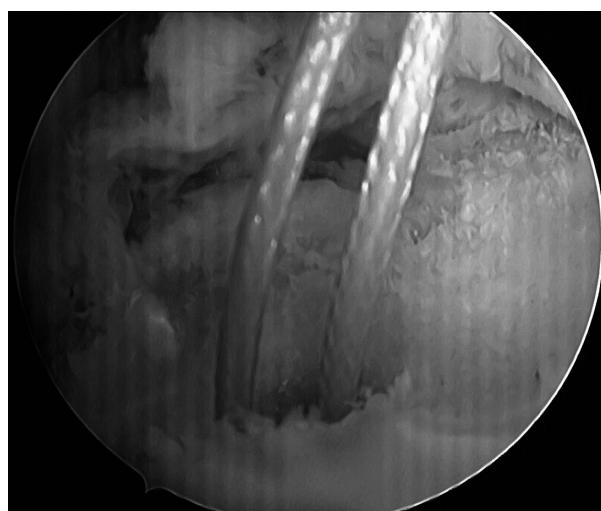


Fig. 5. Inserted anchor

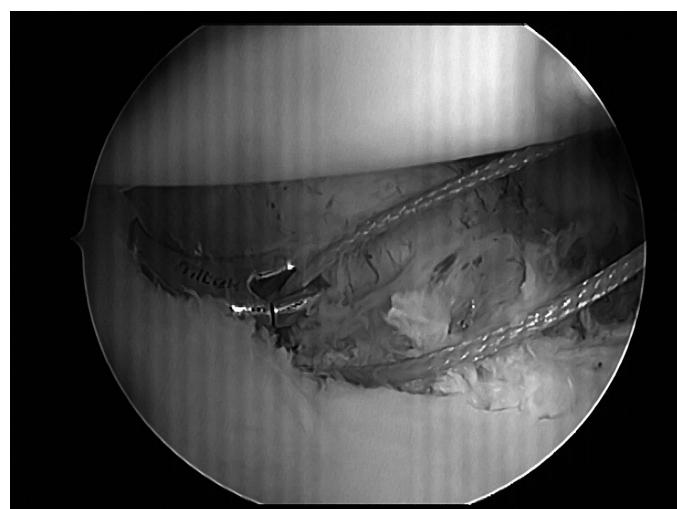


Fig. 6. Capturing the labrum

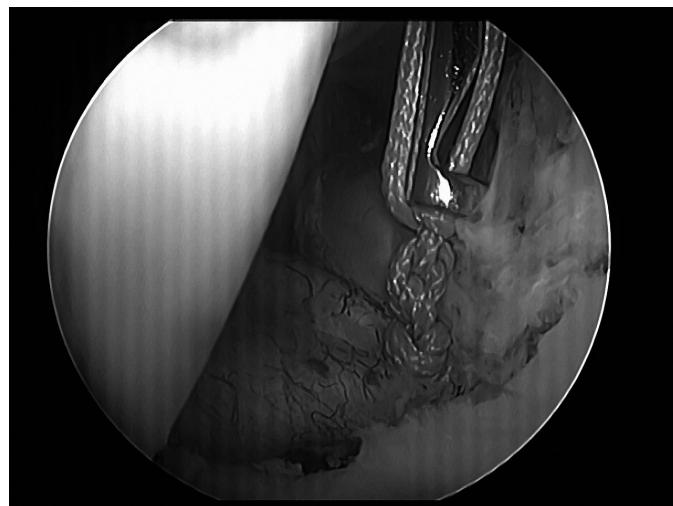


Fig. 7. Intra-articular knotting

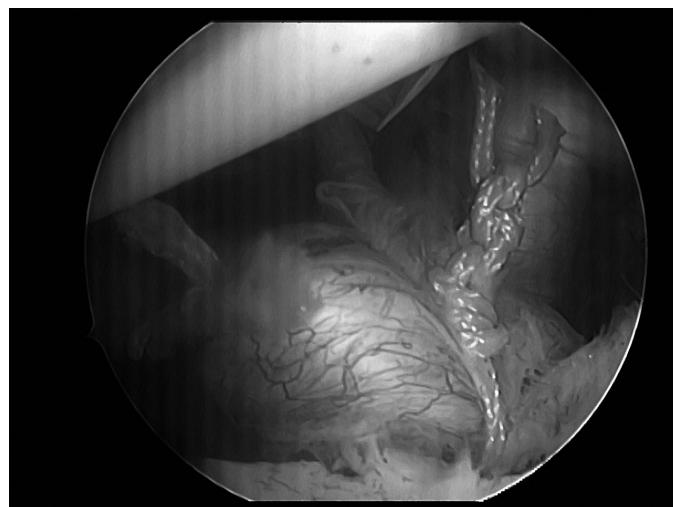


Fig. 8. The resulting nodes

abduction. After three months we allowed the patient to perform non-contact sports, and from 6 months contact sports and sports where limb extension above the head may occur was permitted.

We evaluated preoperative status and postoperative results using the scoring system according to Rowe. This evaluation score was chosen for its breadth and simplicity. This system evaluates four monitored areas, namely: pain, stability, movement and functional ability. The maximum number of points attainable is 100. 100 to 90 is classified as excellent, 89-70 as good, 69-40 as satisfactory and less than 39 points as poor results (13).

## RESULTS

The studied group of patients consisted of 72 males (79.1 %) and 19 women (20.9 %). The average age of patients was 28.6 years (range 16-70 years).

Most patients were between 21-30 years, this group of patients had the highest level of sporting activity. In all patients their first shoulder dislocation was caused by an accident. The average number of shoulder dislocations before surgery was 5.6 (range 1-20). The average time from the first dislocation caused by trauma to the surgical treatment was 31.9 months (range 2-98 months).

In the initial phase of the operation, we performed a standard diagnostic arthroscopy, which aimed to confirm or exclude the presence of pathological changes, determine their extent and decision making regarding surgery. Arthroscopy confirmed the presence Bankart lesions in each patient, of which two (2.2%) patients were osteal Bankart lesion with detachment of the anterior edge of the glenoid with minimal detachment. The most common pathology was Hill – Sachs lesion, which occurred in 72 cases

(79.1 %), where none of the lesions exceeded 30% of the articular surface of the humeral head. Another frequently occurring pathology was a supraspinatus muscle tendon lesion, which occurred in 13 (14.3 %) patients. It was a partial lesion of the articular surface of tendon with shredding. In no cases did MRI confirm a complete rupture. During arthroscopy, we detected in eight (8.8%) cases the presence of chondral lesions of the glenoid and humeral head. SLAP lesions occurred in seven cases (7.7%), of which three patients were SLAP I lesion, in one patient SLAP IV lesion, and in 3 cases SLAP V lesion. In 6 patients (6.6%) joint mice were found and removed. Six cases (6.6%) were diagnosed with redundant anterior capsule in patients who did not show signs of generalized articular laxity. In this study group of patients, 10 patients had no associated pathology apart from Bankart lesion. In the rest of patients, there was associated pathology in addition to the Bankart lesion.

During surgical treatment, which aimed re-fixation of labroligamental complex to the anterior edge of the glenoid, we used the technique of arthroscopic suture fixation using anchors. For fixation, we used titanium anchors MITEK GII in 34 (37.4 %) cases, and absorbable anchors BIO ANCHOR were implanted in 53 (58.2 %) patients. In four, (4.4%) we used a combination of titanium and absorbable anchors.

For fixation, we used 2-4 anchors. Frequently we fixed labrum with three anchors (71.4%). These were pre-made single and double anchors. We used fiber PDS II, Ethibond (Ethicon and Johnson & Johnson

comp.) and Orthocord (DePuy and Johnson & Johnson com). Average monitoring time since the surgery was 62.9 months (range 12-127 months).

In the preoperative evaluation, the mean Rowe score was 37.1 (range 15-55). Postoperatively we observed a significant increase in score according to Rowe up to 87.4 ( $p < 0.000?$ ) (range 45-100), which was evaluated 12 months after surgery. When analyzing the results of operations, we evaluated the condition as excellent in 65 patients (71.4%). This means a full stability of the shoulder joint and full or almost full return to preoperative function and mobility of the shoulder. In 14 patients, (15.4%) their status was assessed as having good function. A good result, was when the joint was stable with minimal movement restriction and functionality of the shoulder. A satisfactory condition was observed in 12 patients (13.2%), where there was occasional aches with only partial return to preoperative function. Three of these patients (3.3%) had a limit of external rotation or abduction of more than 25% (Table 1).

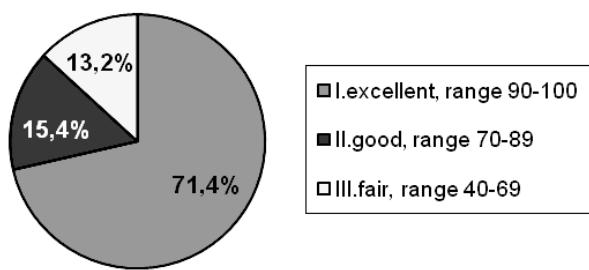
In five patients had recurrence of dislocation of the shoulder. All dislocations occurred by accident more than 12 months after surgery.

We evaluated the incidence of intraoperative and postoperative complications and found there was no significant intraoperative or postoperative complications which could significantly affect the postoperative condition. On follow up x-rays, there were no changes in bone resorption, malposition or detachment of the anchors (Fig. 9).



Fig. 9. Postoperative X-ray

Tab. 1. Postoperative Rowe score



## DISCUSSION

The aim of all shoulder joint stabilization operations is to prevent further dislocation and restore anatomical continuity of the capsulolabral complex to the anterior and inferior aspect of the glenoid. Despite the excellent results of the open Bankart technology, interest has increased in an arthroscopic solution. The reasons for this are smaller skin incisions, a shorter operative time, complete joint examination is possible with treatment of intra-articular lesions, there is less soft tissue damage, a faster onset of rehabilitation and less restriction on movement, especially external-rotation [14,1].

Several studies compared clinical outcomes after open versus arthroscopic surgeries. Petrera et al in their meta-analysis of 501 patients with front post-traumatic instability, operated using suture anchors (234 arthroscopically and 267 openly) and found about the same incidence of recurrence of instability (6 % in arthroscopic and 6.7 % for open techniques) and the need for reoperation (4.7 % and 6.6 %) (11). The five cases of recurrent dislocations (5.5 %) in our study is consistent with other studies, where the percentage of dislocation ranges from 5-7 % (6, 17, 4). In analyzing the causes of recurrence, we found that all were caused by trauma. In one case where the patient was a kayaker a cause of failure may be the fixation of the labrum was with only two anchors.

It is often discussed whether surgical intervention should occur after the first episode of dislocation or wait until relapse occurs. Pasha et al considers that arthroscopic stabilization following the first traumatic dislocation in young patients (under 30 years old) should be the method of choice. In a group of 18 patients treated with anchors MITEK GII with follow-up periods from 12 to 26 months, there were no recurrence of dislocation (10). When there is a number of dislocations, there is an increase in the risk of

damage to the glenohumeral ligament and Hill – Sachs lesion, which in turn may increase the risk of recurrence after arthroscopic surgery [16]. These arguments appear to correlate well with our set, in which the patients have been divided into three groups according to the number of dislocations before surgery. Patients in groups with a higher number of dislocations achieved lower postoperative score according to Rowe [13]. It is clear to us that the arthroscopic solution appears to be better if done promptly.

Lino et al found in a group of 27 patients with a mean follow-up time of 32.4 months that stability of all the shoulders could be achieved. Preoperative score according to Rowe has increased from an average of 39.8 to 90.7 postoperatively [7]. In our group of operated patients, there has been a significant improvement of Rowe score from preoperative value of 37.1 to 87.4. These results correspond with other studies [8,12,9].

In the technique we used, we implanted anchors on the anterior edge of the glenoid and capsular stitches were placed on the Bankart lesion, which created a mound of soft tissue at the edge of the glenoid wall, which led to an increase in contact between the humeral head and glenoid and better toning of the anterior case. This allowed the restoration of adhesion – cohesion mechanism between the humeral head and glenoid. Holibka et al concluded that the introduction of the implant into the anterior edge of the articular surface of the socket creates a stronger capsulolabral mould preventing dislocation of the humeral head. This is a better solution than placing the implant at the anterior edge of the glenoid joint [5].

Important part of our post-operative care is anti-thrombotic prophylaxis following arthroscopic procedures. Antithrombotic prophylaxis consists of mechanical and pharmacological methods. In literature the incidence of venous thromboembolism in this surgery is about 0,31% [2].

One of the exclusion criteria of our group was bony defect of the front glenoid. In two patients, we diagnosed intraoperatively an anterior labrum tear and a small bone fragment of the glenoid. In both cases we excised the fragments and re-fixed the labrum. In both cases, there was no recurrence of instability. A similar situation was also found by Sadovský et al in three patients. He removed the detached bony lamella with a shaver and re-fixed the edge of the glenoid labrum to the defect. In all cases, there has been healing and the shoulder joint was stable [15].

## CONCLUSIONS

Arthroscopic stabilization of anterior instability of the shoulder using the suture anchor technique can be, in the hands of an experienced surgeon, quick and gentle to the patient due to its minimally invasive technique. This surgical solution achieved not only anterior stability by re-fixation of the labroligamental complex, but also reduced the pathological anterior compartment. In conjunction with comprehensive rehabilitation there is an early return to the original activities and the reduction of residual restriction of shoulder movement.

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