

Particularities of Shoulder Recovery After Arthroscopic Bankart Repair with Bioabsorbable and Metallic Suture Anchors

CATALIN CIRSTOIU¹, RAZVAN ENE^{1*}, ZSOMBOR PANTI¹, PATRICIA ENE², MONICA CIRSTOIU³

¹Orthopaedics-Traumatology Department of Bucharest Emergency University Hospital, 169 Splaiul Independentei, 050098, Bucharest, Romania

²E.N.T. Department of Bucharest Emergency University Hospital, 169 Splaiul Independentei, 050098, Bucharest, Romania

³Obstetrics-Gynecology Department of Bucharest Emergency University Hospital, 169 Splaiul Independentei, 050098, Bucharest, Romania

Dislocation of the humeral head is a very common traumatic disorder of the shoulder. Most of the time the dislocation is antero-inferior, which causes a detachment of the antero-inferior capsulolabral complex. This injury predisposes to redislocation, thus requiring surgical fixation, the so called Bankart repair, during which the labrum is reinserted to the glenoid cavity. The aim of our study is to follow the particularities of the outcome after the arthroscopic Bankart repair, accomplished with two different types of suture anchors, bioabsorbable and metallic anchors. Considering the surgical technique there is no difference between the implantation of the two types of suture anchors. There was no significant difference in the rehabilitation outcome between the studied groups. Our results correspond with the findings of other research papers. The arthroscopic management of Bankart lesion is less invasive, which shortens the rehabilitation period. The main disadvantages of metallic suture anchors are the loosening of the anchor and the revision surgery, which also can be complicated.

Keywords: Bankart lesion, shoulder arthroscopy, shoulder recovery, suture anchors

The shoulder is the most flexible joint and with the highest range of motion in the human body. These characteristics, sport activities and the decreased coverage of the humeral head make this joint to become more unstable. As such the glenohumeral joint is the most commonly dislocated joint [1].

Due to the anatomical characteristics, in 80% of the cases, dislocation occurs in an antero-inferior direction. This injury produces a detachment of the antero-inferior capsulolabral complex, the so called Bankart lesion, which predisposes to further dislocation of the shoulder [2].

In the last decades several methods were described in the literature for the reinsertion and fixation of the Bankart lesion. Nowadays the arthroscopic repair is the most commonly used technique in which the detached part of the capsulo-labral complex is reinserted with the help of suture anchors [3]. More than 100 types of suture anchors are available on the market, which are widely used in orthopedic surgery. Suture anchors made of metal have the disadvantage of loosening, migration, loss of fixation and they can make difficult the revision surgery [4,5].

The newest types of suture anchors are made of polyglycolide which is hydrolyzed and replaced by bone [5,6,14-16].

The aim of our study was to follow the particularities of the outcome after the arthroscopic Bankart repair, realized with two different types of suture anchors, bioabsorbable and metallic anchors.

Experimental part

Material and methods

Our study includes a number of 30 patients from the 2010-2014 period, with recurrent anterior dislocation of the shoulder and antero-inferior detachment of the capsulo-

labral complex. These patients underwent to arthroscopic repair for the aforementioned lesion with the use of two different types of suture anchors, in the Orthopedics and Traumatology department of the Emergency University Hospital of Bucharest (fig.1)

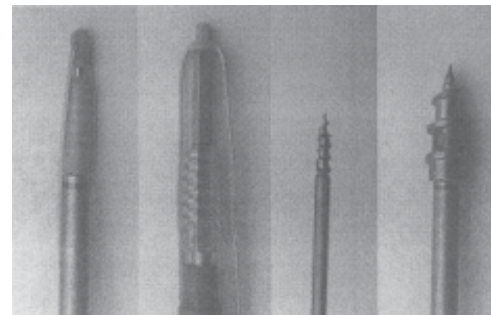


Fig. 1. Different types of suture anchors

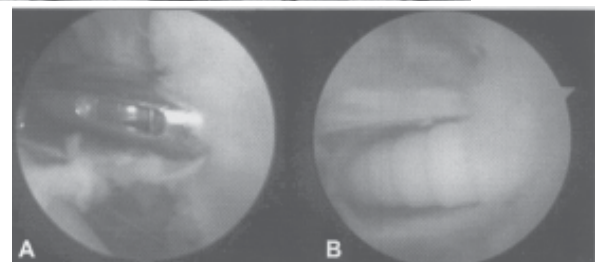


Fig. 2. Arthroscopic view of the Bankart lesion and fixation of the lesion with (A) metallic suture anchor and (B) bioabsorbable suture anchor

For the surgery the patients were positioned in supine in the so called X“beach chair“ position. A posterior and two anterior arthroscopic approaches were used. After finding the capsulo-labral lesion shaving were performed in order to obtain more visibility of the injury and anatomic reduction (fig. 2.). The fixation of the labrum was performed

* email: razvan77ene@yahoo.com; Tel.: : 0040740082338

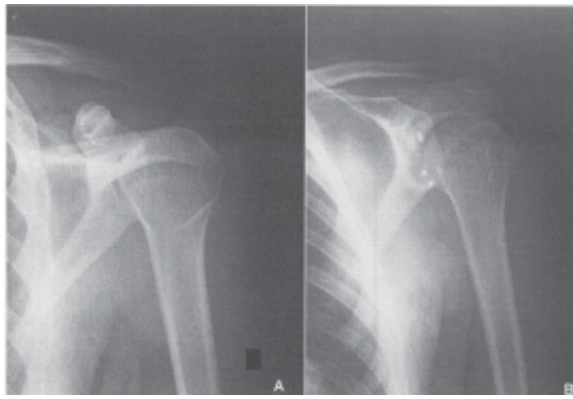


Fig. 3. X-ray showing (A) bioabsorbable suture anchor and (B) metallic suture anchor

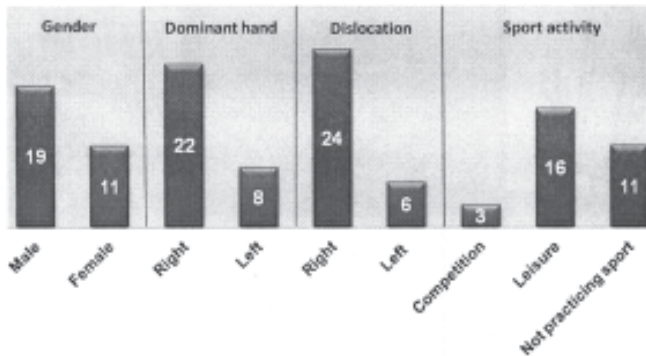


Fig. 4. Showing particularities of the studied cases

with suture anchors, in the position of 3 o'clock and in some cases, with greater lesion, at 5 o'clock.[3]

After surgery X-ray examination was performed in line with our protocol. (fig. 3.)

Shoulder rehabilitation was initiated immediately after surgery, with the following exercises: passive and active motion with limited external rotation, abduction and flexion for the first 2 weeks after surgery with progressive increase of the range of motion for the following weeks.

For the evaluation of the shoulder recovery we used the Walch-Duplay score at 3 and 6 months after surgery. [7] The Walch-Duplay evaluates the activity of the patients, the stability, pain and mobility of the shoulder. We also used the simple (0-10) visual analog scale (VAS pain) to evaluate shoulder pain, during the same period as the aforementioned shoulder score.

Results and discussions

We evaluated 19 male and 11 female patients with an average age of 30.2 with ± 6.09 SD (fig. 4.).

In 14 cases we applied metallic (M) anchors and bioabsorbable (B) suture anchors with Bio-FASTak™ by Arthrex for the rest of the cases, using the same arthroscopic technique. At three months after surgery the average Walch Duplay score for the B suture anchor group was 72.18 ± 9.12 SD, and $72,85 \pm 12.04$ SD for the M suture anchor group. At 6 months the scores were the followings: 90 ± 7.30 SD for the B suture anchor group and 88.57 ± 9.49 SD for the M suture anchor group (fig. 5).

There was no statistically significant difference between the two, Bioabsorbable and Metallic suture anchor groups, (p value > 0.05), but a significant increase of the Walch Duplay score was detected from 3 to 6 months, with good results ($p=0.0221$).

The VAS score showed a significant decrease of the pain from 3 to 6 months ($p=0,03$), however there was no significant difference between the two Bioabsorbable and Metallic suture anchor group (fig. 6.).

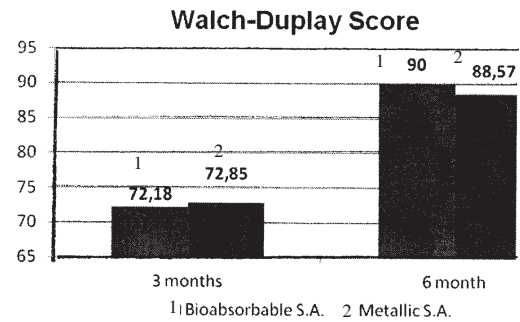


Fig. 5. Walch-Duplay score at 3 and 6 months after Bankart surgery with Bioabsorbable and Metallic suture anchors,

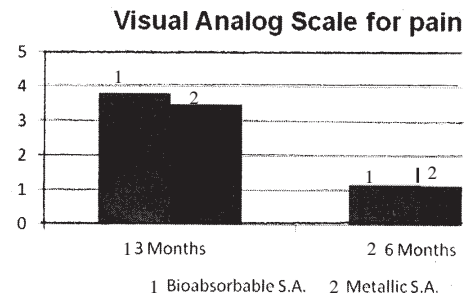


Fig. 6. VAS for pain evaluation from 3 to 6 Months after surgery

The treatment of the Bankart lesion underwent several changes in the last decades. Initially the results of the open Bankart repair were superior to the arthroscopic repair. Due to the development of arthroscopic techniques and the increasing use of suture anchors allowed to achieve comparable results with the open repair. Thus suture anchors are being widely used to reattach ligaments and tendons to bone in orthopedics surgery [3, 5, 6, 8].

A comparative study, by Fabbriani C. et al showed no significant difference between arthroscopic and open repair of the Bankart lesion. Other research papers highlight the variability pathology of shoulder instability, which explains the limited adequacy of shoulder arthroscopy [9-12]. Despite of the similar results in motion, Ateschrang A. et al preferred method is the arthroscopic Bankart repair, due to the shorter operation time and shorter hospitalization after the surgery. [13]

In our study we focused on the outcome of arthroscopic capsulo-labral reinsertion with the two main groups of suture anchors, in shoulder instability. Our findings show that there is no significant difference between the two types of suture anchors in short follow-up period.

The results of a biomechanical study by Bottoni CR et al. showed that bioabsorbable suture anchors required a higher force so that the failure to occur compared to metallic anchors. Their study underlines the absence of inflammatory and foreign body response to bioabsorbable anchors. Inflammatory response is one of the reasons for metallic anchor loosening or migration [4.] After Speer et al the ideal suture anchor should be without toxicity antigenicity, pyrogenicity, and carcinogenicity. They also say that the absorbing time of bioabsorbable anchors is crucial for good biomechanical outcome after surgery [14]. There are around 40 types of bioabsorbable anchors available in the market. The most commonly used bioresorbable anchors are made of polyglycolic acid (PGA) polylactic acid (PLA) and poly-D-L-lactic acid copolymer polyglycolic acid (PDLLA-co-PGA). The biochemical structure influences the resorption time, the molecular weight influences the mechanical strength of the anchors. Polyetheretherketon (PEEK) is a newer material which has the most remarkable load-to-failure [15-18].

The results of our study showed the good results of both type of suture anchor, in short term follow up, after 3 and 6 months of surgery.

The Walch-Duplay test is an easily applicable questionnaire for evaluation of shoulder recovery [7, 19, 20]. We note that most of our patient was doing leisure sport activities; only 3 were doing competitive sport. Daily activity was progressively resumed after surgery, with significant difference between 3 and 6 month after surgery.

Conclusions

Shoulder dislocation, during which a Bankart lesion can occur, in young persons with an active lifestyle, commonly occurs in the dominant arm. To avoid re-dislocation, arthritic degeneration of the hyaline cartilage and to maintain the function of the shoulder is crucial to repair the instability of the joint.

Suture anchors are an excellent mean of reinsertion of the capsule-labral complex. The Walch-Duplay test is an easily applicable test for the evaluation of activity, stability, pain and mobility of the shoulder after arthroscopic Bankart repair.

The test showed good results in both of the studied groups, without statistically significant difference between bioabsorbable and metallic suture anchors; however at 6 months after surgery the values of the Walch-Duplay score showed an increase, which represents a good evolution of the mobility, stability of the shoulder and activity of the patients.

The VAS showed a significant decrease of pain from 3 to 6 months, which also underlines the good outcome of both types of suture anchors.

References

- 1.F. CUEFF, M. ROPARS, F. CHAGNEAU, H. THOMAZEAU, E. BERTONC, G. NOURISSAT, the French Arthroscopy Society - Interest of complementary inferior glenohumeral ligament fixation in capsulo-labral repair for shoulder instability: A biomechanical study; *Orthopaedics & Traumatology: Surgery & Research* (2010) 96S, S94–S98
- 2.GERARD WW EE*, SEDEEK MOHAMED, ANDREW HC Tan - Long term results of arthroscopic bankart repair for traumatic anterior shoulder instability; *Journal of Orthopaedic Surgery and Research* 2011, 6:28
- 3.HYUNG LAE CHO, MD, CHOON KEY LE, TAE HYOK HWANG, KUEN TAK SUH, Jong Won Park - Arthroscopic Repair of Combined Bankart and SLAP Lesions: Operative Techniques and Clinical Results; *Clinics in Orthopedic Surgery* 2010; 2:39-46;
- 4.C R. BOTTONI; DE. BROOKS; T M. DEBERARDINO, B D. OWENS; K L. JUDSON; J S. EGGERS; M Z. MAYS - A Comparison of Bioabsorbable and Metallic Suture Anchors in a Dynamically Loaded, Intra-articular Caprine Model. *Orthopedics* November 2008; 31;11: 1-7.

- 5.E. JEFFREY POPE, M.D., JAMES P. WARD, M.D., ANDREW S. ROKITO, M.D.- Anterior Shoulder Instability; A History of Arthroscopic Treatment; *Bulletin of the NYU Hospital for Joint Diseases* 2011;69(1):44-49;
- 6.DOO-SUP KIM & CHANG-HO YI & YEU-SEUNG YOON- Arthroscopic repair for combined Bankart and superiorlabral anterior posterior lesions: a comparative study between primary and recurrent anterior dislocation in the shoulder; *International Orthopaedics (SICOT)* (2011) 35:1187–1195
- 7.KHIAMI F, SARIALI E, ROSENHEIM M, HARDY P. Anterior shoulder instability arthroscopic treatment outcomes measures: the WOSI correlates with the Walch-Duplay score. *Orthop Traumatol Surg Res.* 2012 Feb;98(1):48-53.
- 8.Swan Jr KG, Baldini T, McCarty EC. Arthroscopic suture material and knot type: an updated biomechanical analysis. *Am J Sports Med* 2009; 37(8):1578–1585.
- 9.FABBRICIANI C, MILANO G, DEMONTIS A, FADDA S, ZIRANU F, MULAS PD, Arthroscopic Versus Open Treatment of Bankart Lesion of the Shoulder: A Prospective Randomized Study; *Arthroscopy: The Journal of Arthroscopic and Related Surgery*, 2004; 20(5): 456-462.
- 10.KANDZIORA F, JÄGER A, BISCHOF F, HERRESTHAL J, STARKER M, MITTLMEIER T. Arthroscopic labrum refixation for post-traumatic anterior shoulder instability: suture anchor versus transglenoid fixation technique. *Arthroscopy*. 2000; 16(4):359-366.
- 11.BOSZOTTA H, HELPERSTORFER W. Arthroscopic transglenoid suture repair for initial anterior shoulder dislocation. *Arthroscopy*. 2000;16(5):462-470.
- 12.LENTERS TR, FRANTA AK, WOLF FM, LEOPOLD SS, MATSEN FA 3rd. Arthroscopic compared with open repairs for recurrent anterior shoulder instability. A systematic review and meta-analysis of the literature. *J Bone Joint Surg Am.* 2007;89(2):244-254.
- 13.ATESCHRANG A, FIEDLER S, SCHRÖTER S, STÖCKLE U, FREUDE T, KRAUS TM. Duration of inability for work and return to physical work after arthroscopic and open labrum refixation. *Z Orthop Unfall.* 2014; 152(3):252-259.
- 14.SPEER KP, Warren RFArthroscopic shoulder stabilization. A role for biodegradable materials. *Clin Orthop Relat Res.* 1993; (291):67-74.
- 15.NHO SJ, PROVENCHER MT, SEROYER ST, ROMEO AA, Bioabsorbable Anchors in Glenohumeral Shoulder Surgery; *Arthroscopy: The Journal of Arthroscopic and Related Surgery*, 2009; 25(7): 788-793.
- 16.GUNJA NJ, ATHANASIOU KA. Biodegradable materials in arthroscopy. *Sports Med Arthrosc.* 2006; 14(3):112-119.
- 17.BARBER FA, HERBERT MA, BEAVIS RC, BARRERA Oro F. Suture anchor materials, eyelets, and designs: update 2008. *Arthroscopy*. 2008; 24(8):859-867.
- 18.KURTZ SM, DEVINE JN, PEEK Biomaterials in Trauma, Orthopedic, and Spinal Implants, *Biomaterials*. 2007; 28(32): 4845–4869.
- 19.WALCH G. The Walch-Duplay Score for Instability of the Shoulder. Directions for the use of the quotation of anterior instabilities of the shoulder. Abstracts of the First Open Congress of the European Society of Surgery of the Shoulder and Elbow, Paris, 1987; 51–55.
- 20.ROMEO AA, BACH BR JR., O'HALLORAN KL, Scoring systems for shoulder conditions *Am J Sports Med*, 24 (1996), pp. 472–476.

Manuscript received: 15.12.2104