CASE REPORT

Arthroscopic Coracoid Bone Block for Posterior Glenohumeral Instability: Description of Surgical Technique and a Case Report

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Received: 6 April 2023 *Accepted: 10 June 2023*

Abstract

This case report describes the surgical technique of posterior arthroscopic bone block using the coracoid graft to treat recurrent posterior dislocations and describes preliminary results. Performance of coracoid transfer as a graft for posterior arthroscopic bone block in one patient (two shoulders) with recurrent posterior glenohumeral instability refractory to clinical treatment for six months, excluding volition dislocation. The patient was followed up weekly for the first three weeks when the stitches were removed. Postoperative computed tomography was performed before the patient was authorized to practice contact and aquatic sports (3–4 months after surgery). Patient returned to previous activities without complaints or limitations. There were no neurovascular complications. The initial results using coracoid as a bone graft for posterior instability were positive, and the technique requires reproduction to investigate possible complications. To date, no study has been found in the literature that reports an open or arthroscopic coracoid bone block technique.

Level of evidence: V

Keywords: Coracoid bone block, Posterior bone-block, Posterior glenohumeral dislocation

Introduction

Posterior glenohumeral instability is a condition responsible for 3% to 5% of shoulder dislocations in the general population and up to 10% in young male athletes.[1-3] Its treatment can be challenging, with delayed diagnosis and poorly established diagnostic tools.[4,5]

The clinical treatment with rehabilitation and rebalancing of shoulder force vectors has shown good results; however, 60% to 80% of re-dislocation makes this treatment insufficient for some patients, especially in a younger population and practitioners of contact sports.[4-6]

Several surgical techniques have been described in the literature, ranging from soft tissue repair, posterior capsuloplasty, and tendon transfers to filling the reverse Hill Sachs and bone blocks with autologous grafts from the iliac crest, acromion, tibial shaft, or distal clavicle. Despite the tibial shaft and the iliac crest being good, strong, and well-known grafts to treat posterior glenohumeral instability, it utilizes another surgery site besides the shoulder, which offers an additional risk of pain, infection, and general complications.[7-11]

Due to the residual instability that the pedicle transfer of the acromion can cause, the pain, and the need to perform invasive procedures in two different surgical sites when the graft is removed from the iliac or tibial shaft, we developed a new surgical technique, where the autologous graft is removed from the coracoid, the conjoined tendon is reinserted at the base of the coracoid, and the coracoid graft is fixed in the posterior glenoid, between six and nine hours, following the principles of the surgery described by Latarjet and improved by anatomical studies regarding the optimization in positioning the coracoid graft to the glenoid.[12]

Case Presentation

A 17-year-old volleyball player female patient, presents at the office with a posterior instability with a glenoid bone loss

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THE ONLINE VERSION OF THIS ARTICLE ABJS.MUMS.AC.IR

estimated at 25% of the normal size (bilateral, in a single patient - glenoid dysplasia)

Both shoulders submitted to this procedure were evaluated with computed tomography and magnetic resonance imaging and were treated following the institution's protocol for posterior glenohumeral instability; submitted to rehabilitation for six months, evolving with new episodes of posterior dislocation.

After the decision to perform the posterior bone block, the idea of transferring the coracoid was developed, already well-established for anterior dislocations. Because of the patient's age, the big bone loss in both glenoids, glenoid dysplasia, and the sports history of the patient, a good and strong surgery that could not fail was thought for the case. As an advantage, the single surgical site and the anatomical knowledge of the area by the senior surgeon, besides a strong graft, led us to choose the coracoid. The conjoined tendon would be reinserted into the remaining base of the coracoid process to avoid deterioration of the shoulder's anterior anatomy.

The procedure was performed first in the right shoulder and, after four months, in the left shoulder. First, the surgery was initiated by shoulder arthroscopy, with the posterior portal followed by the anterior and joint inventory. Next, the posterior glenoid was prepared to receive the coracoid graft, undergoing debridement and resection of the posterior labrum that can interpose between the graft and the glenoid with visualization by the posterolateral portal and posterior portal as a work portal [Figure 1].

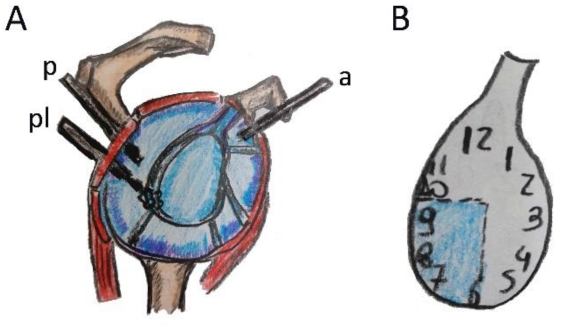

Figure 1. (A) Arthroscopic portals: P, posterior; PL, posterolateral; A, anterior. (B) Preparation of the posterior glenoid should be done between 6-9 o'clock

An accessory portal for debridement and resection of the coracoid is performed in its apophysis, in the position exactly over the coracoid, called portal C.

The skeletonization and preparation of the coracoid process is made by visualization: midsub portal, work portals: coracoid [Figure 2: The midsub portal is 1 cm above the axillary crease and in line with the coracoid].

Correct visualization of the coracoid process was essential to resecting the coracoid tip and reinserting the conjoined tendon in the coracoid apophysis.

After coracoid excision, it was removed from the shoulder and prepared by the auxiliary surgeon, who finished performing the skeletonization and molding the graft. Two coracoid holes were made under the alpha and beta guide, with at least 0.5 cm of distance, to the screw insertion that would attach the graft to the posterior glenoid (DePuy Synthes® Arthroscopic Latarjet Kit) [Figure 3].

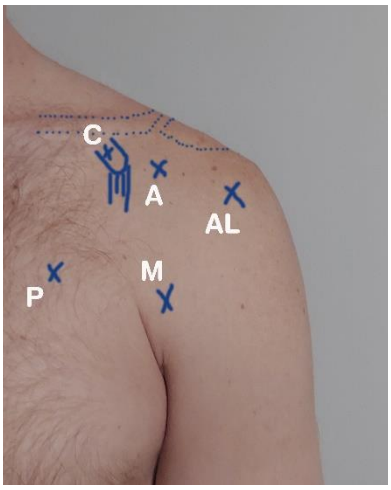

Figure 2. Arthroscopic portals. (A) Anterior portal; (AL) anterolateral portal; (M) midsub portal; (P) pectoral portal

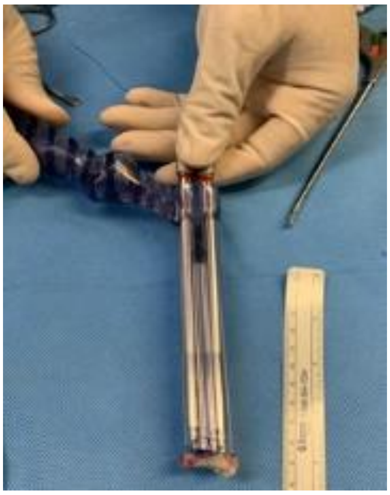

Figure 3. Graft prepared and attached to the joystick (alpha and Beta guides)

While the auxiliary surgeon prepared the coracoid, the main surgeon reinserted the conjoined tendon into the remaining coracoid with a 4.5 mm anchor through the coracoid portal, using the anterolateral portal for visualization (anchor for tears of the rotator cuff) [Figure 4].

The next step was to attach the guide (joystick) with the alpha and beta guides to the coracoid holes and place the coracoid in the posterior glenoid through the enlarged posterior portal to about 3 cm [Figure 5].

The posterolateral portal is used to visualize the positioning of the coracoid graft in the posterior glenoid. The positioning follows the parameters used in the standard posterior bone block procedures anteriorly described in literature[2,3] between 6 and 9 o'clock and with a distance of

0.5 cm medial to the glenoid rim [Figure 6]. The glenoid holes were drilled through the joystick, and the two cortical screws were passed according to the measurement performed.

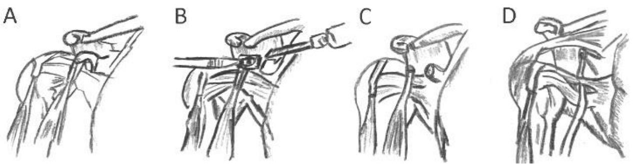

Figure 4. Schematic drawing of the surgical procedure. (A) Visualization of coracoid; (B) Resection of coracoid tip that will be used as a graft; (C) Coracoid tip is removed and conjoined tendon kept close to the rest of coracoid bone; (D) Conjoined tendon attached to the rest of coracoid bone with anchors

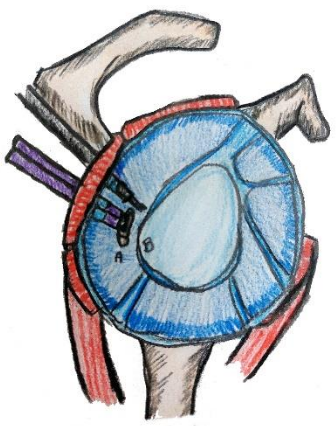

Figure 5. The coracoid tip in the joystick getting into the attachment point by the posterior portal augmented to 3 cm (A). The localization of the insertion of coracoid graft in the glenoid prepared, between 6-9 o'clock (B)

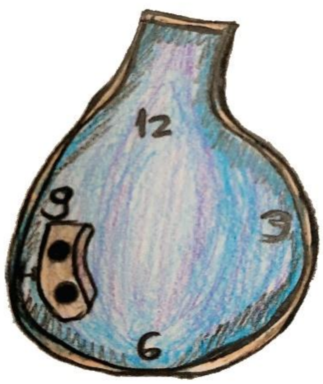

Figure 6. Coracoid graft between 6-9 o'clock and 0.5 cm medial to the glenoid rim cortical screws positioned in the glenoid

The positioning was checked by intraoperative radioscopy and direct arthroscopic visualization. Once the graft positioning was acceptable, the procedure was completed.

The patients were immobilized with an abduction sling and remained at relative rest for one week. After one week, passive range of motion (ROM) gain exercises were started. After three weeks, they began active ROM gain exercises, and after six weeks, activation of the shoulder muscles. Aerobic exercises such as running were started at six weeks, and strengthening exercises at three months. The patients were discharged after six months, but they could perform most of the pre-surgery activities at three to four months.

After the surgical procedure, the two shoulders were followed up weekly during the first three weeks when the stitches were removed. Rehabilitation programming was performed as described above, and at four months, the two shoulders were completely rehabilitated and asymptomatic. Postoperative computed tomography showed consolidated grafts and screws outside the joint between three and four months [Figures 4 and 5]. Until the last consultation, the patient had no complaints or limitations. There were no neurovascular complications related to the procedure.

Discussion

The recurrence rate with arthroscopic treatments for labral repair is high, especially in patients with high demand, significant bone loss of the glenoid and humeral head, and associated lesions that lead to recurrent posterior shoulder instability.[9]

When evaluating athletes' shoulders submitted to different surgical treatments (arthroscopic with labral repair, posterior bone block with iliac crest, or acromion graft), Garret et al. achieved excellent results with the three techniques. This study's important and interesting finding is that glenoid cartilage damage is a risk factor for arthroscopic treatment only, with labral repair evolving with incomplete shoulder recovery.[13]

A systematic review performed by Mojica et al. showed excellent clinical and subjective results (Constant, Walch – Duplay, and Rowe scores) of several treatments with bone block published in recent years, despite the 14% rate of residual shoulder instability appearing as the main complication. According to the study, a discrepant relationship between residual posterior instability and clinical and subjective results leads to treating posterior bone block as a great option, requiring further investigations.[14]

About the use of the coracoid graft and the reinsertion of the conjoined tendon in its origin, we observe that the release of the conjoined tendon and its reinsertion has already been used in other procedures, for example, for the treatment of fracture–dislocations of the proximal humerus, where the humeral head is in the axilla, or during tenotomy of the conjoined tendon in cases of new anterior dislocation after a Latarjet's procedure and so, the technique is secure, without loss of function in the anterior shoulder or neurovascular risk if it's performed by an experient shoulder surgeon.[15]

The strength of this article is to show that it is possible to utilize a well-known autograft that uses only one site of surgery without causing anterior shoulder instability and through an arthroscopic technique, which provides faster recovery and safety for young patients to return to contact sports practicing, without the risk of shoulder dislocation that is present in the conservative treatment or even in the soft tissues surgery. In addition, the knowledge of shoulder anatomy by the surgeons who treat the pathology, using the coracoid as a graft in the posterior glenoid can improve the instability symptoms since the coracoid anatomy fits appropriately to the glenoid, becoming a promising alternative.

However, the technique requires the reproduction of more cases to obtain more accurate data regarding the positioning of the graft, clinical and subjective results, and possible complications, and therefore be possible to compare this technique and this graft with the others already available in the literature.

Using the coracoid as a bone graft is a viable alternative, especially for addressing a single surgical site, and is a reliable bone graft with favorable anatomy to use in the glenoid. The outcomes were positive, and the technique requires reproduction to investigate possible complications. To date, no study has been found in the literature that reports an open or arthroscopic coracoid bone block technique.

Acknowledgement

Not applicable

Conflict of interest/Funding: Author Wagner Castropil is a paid consultant for DePuy Synthes. All other authors declare that they have no potential conflict of interest.

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References

1. Alepuz ES, Pérez-Barquero JA, Jorge NJ, García FL, Baixauli VC. Treatment of the Posterior Unstable Shoulder. Open Orthop J. 2017; 11:826-847. doi: 10.2174/1874325001711010826.
2. Cerciello S, Visonà E, Morris BJ, Corona K. Bone block procedures in posterior shoulder instability. Knee Surg Sports Traumatol Arthrosc. 2016; 24(2):604-11. doi: 10.1007/s00167-015-3607-7.
3. DiMaria S, Bokshan SL, Nacca C, Owens B. History of surgical stabilization for posterior shoulder instability. JSES Open Access. 2019; 3(4):350-356. doi: 10.1016/j.jses.2019.08.008.
4. Valencia Mora M, Martínez Menduiña A, Hernández Galera C, Pérez Expósito R, Aramberri Gutiérrez M. Risk of neurological injury in posterior bone block surgery for recurrent glenohumeral instability: a cadaveric study. Arch Orthop Trauma Surg. 2018; 138(12):1719-1724. doi: 10.1007/s00402-018-2986-x.
5. Qi W, Zhan J, Yan Z, Lin J, Xue X, Pan X. Arthroscopic treatment of posterior instability of the shoulder with an associated reverse Hill-Sachs lesion using an iliac bone-block autograft. Orthop Traumatol Surg Res. 2019; 105(5):819-823. doi: 10.1016/j.otsr.2019.03.017.
6. Langlais T, Hardy MB, Lavoue V, Barret H, Wilson A, Boileau P. Recurrent posterior shoulder instability starting in childhood and adolescence. Bone Joint J. 2020; 102-B (12):1760-1766. doi: 10.1302/0301-620X.102B12.BJJ-2020-0296.R1.
7. Boileau P, Hardy MB, McClelland Jr WB, Thélu CE, Schwartz DG. Arthroscopic posterior bone block procedure: a new technique using suture anchor fixation. Arthrosc Tech. 2013;2(4):e473-7. doi: 10.1016/j.eats.2013.07.004.
8. Arner JW, Elrick BP, Nolte PC, Goldenberg B, Dekker TJ, Millett PJ.Posterior Glenoid Augmentation With Extra-articular Iliac Crest Autograft for Recurrent Posterior Shoulder Instability. Arthrosc Tech. 2020; 9(9):e1227-e1233. doi: 10.1016/j.eats.2020.04.023.
9. Smith T, Goede F, Struck M, Wellmann M. Arthroscopic posterior shoulder stabilization with an iliac bone graft and capsular repair: a novel technique. Arthrosc Tech. 2012; 1(2):e181-5. doi: 10.1016/j.eats.2012.07.003.
10. Métais P, Grimberg J, Clavert P, et al. Posterior shoulder instability managed by arthroscopic acromial pediculated bone-block. Technique. Orthop Traumatol Surg Res. 2017; 103(8S):S203-S206. doi: 10.1016/j.otsr.2017.09.001.
11. Bhatia S, Frank RM, Ghodadra NS, et al. The outcomes and surgical techniques of the latarjet procedure. Arthroscopy. 2014; 30(2):227-35. doi: 10.1016/j.arthro.2013.10.013.
12. Lafosse L, Lejeune E, Bouchard A, Kakuda C, Gobezie R, Kochhar T. The arthroscopic Latarjet procedure for the treatment of anterior shoulder instability. Arthroscopy. 2007;23(11):1242.e1-5. doi: 10.1016/j.arthro.2007.06.008.
13. Garret J, Nourissat G, Hardy MB, et al. Painful posterior shoulder instability: Anticipating and preventing failure. A study in 25 patients. Orthop Traumatol Surg Res. 2017; 103:S199-S202. doi:10.1016/j.otsr.2017.08.005.
14. Mojica ES, Schwartz LB, Hurley ET, Gonzalez-Lomas G, Campbell KA, Jazrawi LM. Posterior glenoid bone block transfer for posterior shoulder instability: a systematic review. J Shoulder Elbow Surg. 2021; 30(12):2904-2909. doi: 10.1016/j.jse.2021.06.013.
15. Altintas B, Martetschläger F, Fritz EM, et al. Conjoint Tendon Tenotomy for Glenoid Exposure in the Setting of Previous Coracoid Transfer. Arthrosc Tech. 2019; 8(11):e1411-e1415. doi: 10.1016/j.eats.2019.07.021.