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Case Report
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Two-year Follow-up after Operative Treatment of an Osseous Bankart Lesion with Flap-Detached Cartilage Lesion of the Glenoid Associated with Absorption of the Glenoid Surface: A Case Report

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Abstract

Background: Glenoid articular cartilage lesion is a rare complication following traumatic anterior dislocation of the shoulder.

Purpose: We report on the case of a 14-year-old male rugby player with traumatic anterior shoulder instability with an extensive flapped lesion on the glenoid articular cartilage with an osseous Bankart lesion.

Method: Arthroscopic findings revealed that the glenoid cartilage was flapped over, extending from the anteroinferior to the center. Repair of the osseous Bankart lesion using suture anchors and resection of the unstable peripheral part of the cartilage was performed arthroscopically. The main region of the injured articular surface was left untouched.

Result: During postoperative follow-up, absorption of the glenoid articular surface near the suture anchor holes was identified. Arthroscopic examination three months post-surgery showed that the flap-detached lesion of the residual cartilage was stable and appeared adapted on the glenoid surface. The resected area was covered by fibrous tissue. A follow-up Computed Tomography (CT) scan revealed that the osseous lesion was united, and the patient returned to the previous sports level four months following the operation. At the 2-year-follow-up, Magnetic Resonance Imaging (MRI) revealed that the glenoid surface was remodeled to a flattened round shape with no signs of osteoarthritis, exhibiting proper conformity of the joint surfaces to the humeral head.

Conclusion: Arthroscopic Bankart repair using suture anchors may cause bone resorption at the glenoid surface and the stabilized *glenohumeral* joint following surgery in young patients with anterior shoulder instability and may lead to remodeling of the glenoid surface from the damaged glenoid cartilage lesion.

Keywords: Anterior instability; Shoulder; Articular cartilage lesion; Arthroscopic; Bankart repair; Rugby

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Introduction

Traumatic anterior shoulder dislocation is frequently associated with osseous Bankart lesions in collision sports, such as rugby [1]. Treatment includes arthroscopic repair of the osseous Bankart lesion, which may lead to glenoid remodeling [1]. On the other hand, Glenoid Labral Articular Disruption (GLAD) is uncommon in cases of traumatic anterior dislocation [2]. Arthroscopic findings indicated that there is a variant of the cartilage lesion, an avulsion of the anteroinferior glenoid labrum and flap tear of the adjacent articular cartilage that is called a Glenoid Labral tear and Articular cartilage Flap (GLAF) lesion [3]. To our knowledge, there have been no reports on GLAF lesions associated with osseous Bankart lesions. We report a rare case of traumatic anterior

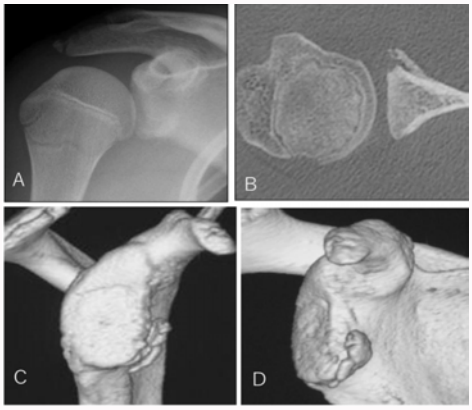

Figure 1: Preoperative images. (A) Plain radiograph, anteroposterior view. (B) 3D CT, sagittal view. An osseous bony lesion was observed in the anteroinferior part of the glenoid. (C) 3D CT sagittal view. (D) 3D CT axial view.

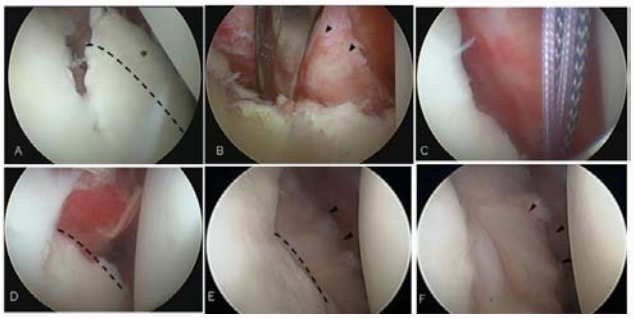

Figure 2: Arthroscopic view from the posterior portal at the initial surgery (A–D) and second surgery (E, F). (A) Anterior part. An extensively flap-detached cartilage lesion (asterisk) in the anteroinferior part of the glenoid. The dotted line indicated the trimming line of the anterior edge of the articular cartilage. (B) Anteroinferior part. Arrowheads showed osseous Bankart lesion. (C) After trimming and placing the most inferior part of the suture anchor. (D) After repair of the osseous Bankart lesion. (E) Anterior part. (F) Anteroinferior part. The detached lesion of the residual cartilage was flattened and stable with fibrous soft tissue covering the area of the healed osseous Bankart lesion.

instability with an extensive GLAF lesion and osseous Bankart lesion treated by arthroscopic osseous Bankart repair for glenohumeral stabilization. An extensive flap-detached cartilage lesion of the glenoid was observed at the initial surgery and significant bone loss at the anterior glenoid was observed during a postoperative CT scan three months after the initial surgery. Therefore, follow-up arthroscopic examination was performed at three months following the initial surgery, and we observed stabilization of the remaining cartilage. It is noteworthy that at the 2-year follow-up the osteolytic change in the glenoid observed at three months was found to be remodeled with the united osseous Bankart lesion.

Case Presentation

A 14-year-old male rugby player tackled an opponent and suffered a subluxation of the right shoulder due to forced abduction and external rotation of his arm. Although he returned to play after conservative treatment by a local physician for two months, he experienced multiple subluxations and was referred to our hospital. Physical examination showed no limitation in the Range of Motion (ROM) of the right shoulder or apparent muscle weakness in any direction. The anterior apprehension test was positive, and the Beighton score was 1, which excluded hypermobility [4]. The patient

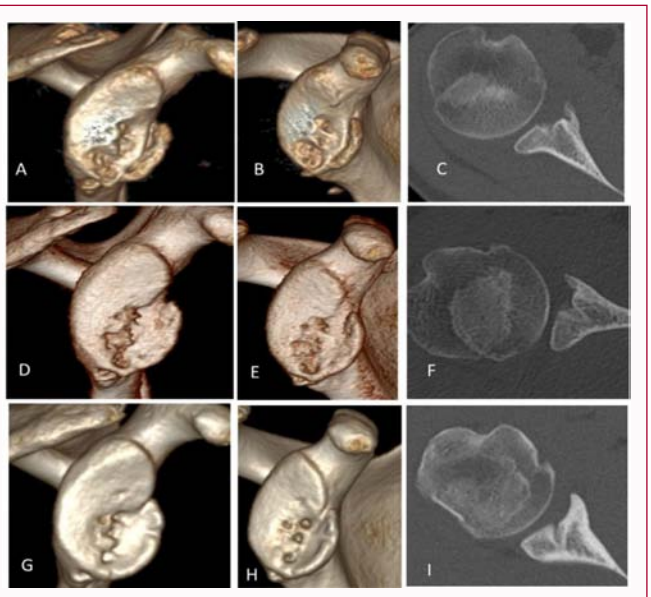

Figure 3: CT images at 3 months (A–C) at 6 months (D–F) and at 2 years (G–I).
(A, D, G) Sagittal view; (B, E, H) Anterolateral view; (C, F, I) Axial view. The osseous Bankart lesion which had not been fully reduced was united at 3 months although osteolytic changes in the glenoid were observed. At 6 months to 2 years, peripheral flattening of the osteolytic lesion as a remodeling was noted.

had an Oxford shoulder instability score of 27 points [5]. Plain radiography showed a residual epiphyseal line in the humerus and an avulsed bone fragment below the glenoid (Figure 1A). A glenoid osseous lesion was confirmed in the anteroinferior part by Computed Tomography (CT) (Figures 1B-1D). Preoperative MRI was not performed as we considered the CT findings sufficient to indicate the primary cause of the condition.

Arthroscopic surgery was performed four months after the injury. The glenohumeral joint was observed from the posterior portal using a 45° arthroscope. An extensive flap-detached cartilage lesion of the glenoid extending from the anterior to inferior margin to the center of the glenoid adjacent to the osseous Bankart lesion (3 to 6 o'clock) was observed (Figure 2A). Although there were a few treatment options, such as removal of the fragment and microfracture or reattachment of the cartilage flap to the glenoid, the flap-detached lesion was left untouched as it was continuous with the normal part of the articular cartilage and hence it was expected that the lesion could be reattached by stabilizing surgery. Therefore, only the osseous Bankart lesion was repaired using four suture anchors (Gryphon BR Anchor; Mitek Sports Medicine, Boston, MA). The anteroinferior rim of the glenoid cartilage was partially resected at a width of 5 mm to enable accurate placement of the suture anchors during the procedure (Figures 2B-2D). The two sutures in the middle penetrated through the substantial bone of the osseous Bankart lesion using a Bone Stitcher (Smith and Nephew, MA, USA) [6]. A standard postoperative rehabilitation protocol for the arthroscopic Bankart repair was implemented, with three weeks of immobilization using an abduction brace followed by gradual passive ROM exercises. A plain X-ray taken at one month postoperatively indicated partial bone resorption in the glenoid, and this change progressed for the following two months. A CT scan at three months postoperatively revealed the healed osseous Bankart lesion, and significant bone loss at the anterior glenoid surface near the area of the suture anchor was

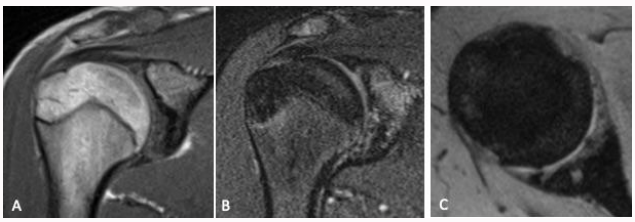

Figure 4: MRI at 2-year follow-up (A) T1 coronal view, (B, C) proton. Sclerotic changes in the subchondral bone and fibrous tissue formation on top of it were noted. Proper conformity with the humeral head was observed.

noted (Figures 3A-3C). We were concerned that the cartilage lesion identified at the initial surgery was more unstable than before, due to bone loss at the glenoid surface. At that time, we proposed to the family and the patient a second surgery to re-evaluate the situation. The patient's parents provided informed consent for performing arthroscopy three months following the initial surgery. The follow-up arthroscopy performed three months after the initial surgery revealed that the flap-detached lesion of the residual cartilage was flattened and stabilized with fibrous soft tissue covering the area of the resected cartilage with the healed osseous Bankart lesion (Figure 2E and 2F). The patient was allowed to begin muscle strength training, running, and handling a ball at three months postoperatively. At six months, Three-Dimensional (3D) CT showed flattened remodeling of the anterior glenoid (Figures 3D-3F). The patient returned to his pre-injury level at eight months. The patient reported no recurrent instability for two years postoperatively and had an Oxford shoulder instability score of 48. CT at 2 years postoperatively showed the united osseous Bankart lesion and the reasonably flattened glenoid surface (Figures 3G-3I). MRI examination two years postoperatively (Figure 4) showed osteosclerotic changes of the subchondral bone revealing fibrous tissue on the surface that appeared to have good conformity with the humeral head.

Discussion

To our knowledge, this is the first report of an operative case of traumatic anterior instability with extensive glenoid articular cartilage lesion accompanied by an osseous Bankart lesion with a 2-year follow-up. Although the damaged cartilage was not directly repaired, arthroscopic follow-up at three months revealed that the lesion had been stabilized following glenohumeral stabilization and osseous reconstruction of the glenoid by arthroscopic osseous Bankart repair [6]. Although postoperative bone resorption was also observed at the anterior part of the glenoid surface where the suture anchors were inserted, there was improvement during the subsequent healing of the osseous glenoid lesion with an eventual return to the pre-injury level. Galano et al. [7] reported that GLAD lesions could be treated by either removal of an irreparable fragment and microfracture or by reattachment of the cartilage flap to the glenoid with a chondral fixation device. Page et al. [3] reported a case in which a GLAF lesion was treated with a meniscal repair device to place a mattress suture in the cartilage periphery after reconstruction of a labral tear with suture anchors to form a neo-labrum in an attempt to overlap and stabilize the flap-detached cartilage lesion. In our case, removal of the cartilage lesion was not considered because the lesion was extensive. To facilitate treatment of the shoulder instability as the priority, only the peripheral cartilage overlying the bony fragment was resected and the osseous Bankart lesion was repaired. Arthroscopy at the 3-month follow-up revealed that the resected cartilage periphery was remodeled and covered by soft tissue, the glenoid subchondral bone was not seen, and was well preserved according to the results of MRI at 2-year follow-up. There are prior studies on cartilage flap tears in association with hip labral tears which suggest high vascularity to the cartilage flap [8]. The patient, in this case, was young and also the osseous involvement was continuous with the cartilage flap tear. Therefore, these factors may have contributed to the flap healing without surgical stabilization. Other treatment options, e.g., the removal of an unstable cartilage fragment and microfracture, could also have been successful. However, resecting the flap-detached cartilage and microfracture would have resulted in the glenoid surface being covered with fibrocartilage, which is different from the normal hyaline cartilage [9]. If MRI or MR arthrography had been performed preoperatively, we would have prepared the treatment options for the cartilage lesion and set out for the initial surgery. Although careful follow-up is still required, it should be noted that most of the flap-detached cartilage was preserved in this case. Postoperative diagnostic imaging revealed bone resorption anteroinferior to the glenoid where the suture anchors were placed, suggesting progression of bone resorption at the anterior margin of the glenoid by the suture anchors. Several previous reports indicated the risks of bone resorption due to suture anchors, especially with materials such as poly-L-lactic and polyglycolic acids [10]. However, the anchors used in this case were a complex of glycolic–lactic acid polyester and beta-tricalcium phosphate, which have not been reported to cause bone resorption. There have been reports on the risk of heat necrosis while drilling bone [11]. Some groups have suggested that lower blood perfusion could cause bone absorption [12]. Anatomical studies have shown a network of arteries supplying the joint capsule, synovial membrane, and periosteum of the glenoid, but low vasculature in the peripheral part of the glenoid [13]. It is assumed that repair of the glenoid osseous lesion led to the improvement of the subchondral bone morphology, which in turn facilitated repair of the damaged cartilage. Even if the bony fragment was not fully reduced, remodeling of the morphology of the glenoid surface can be expected by bony healing [14]. It was critical to repair the osseous Bankart lesion and to avoid resection of the damaged cartilage fragment to reduce the risk of osteoarthritis in the future [1]. One of the limitations of the study is that we did not perform an osteochondral biopsy during the second surgery. More convincing evidence would have been obtained if we took an osteochondral biopsy during the second surgery that confirmed healing of the chondral flap to the underlying subchondral bone of the glenoid and documented the viability of the previously detached chondral flap.

A secondary center of ossification in the scapular glenoid usually appears at 11 years of age and disappears at ~17 or 18 years of age. As the epiphyseal line is located in the upper third of the glenoid, the areas of separated cartilage and the osseous Bankart lesion were expected to have high healing potential because of the patient's age, which was indicated by the residual epiphyseal plate [15,16]. Therefore, in cases of cartilage injury and osseous Bankart lesion in an adolescent patient, it is important to consider the mechanism of injury and reconstruct the main lesion, and to avoid resecting the cartilage and osseous lesions.

Conclusion

We reported on a 14-year-old rugby player with traumatic anterior instability, with an extensive GLAF lesion and osseous Bankart lesion treated by arthroscopic osseous Bankart repair.

Arthroscopic osseous Bankart repair using suture anchors can cause bone resorption at the glenoid surface and the stabilized joint. In young patients, arthroscopic Bankart repair may lead to remodeling of the glenoid surface from the damaged glenoid cartilage lesion.

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