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Arthroscopic glenoid reconstruction for glenoid bone loss in recurrent anterior glenohumeral instability, using osteochondral autograft from the contralateral lateral femoral condyle: a new technique and case report

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Many surgeons have recognized that significant glenoid bone loss is one of the major risk factors for recurrence of anterior glenohumeral instability after arthroscopic soft tissue stabilization.[4,5] Glenoid reconstruction with bone graft has been recommended in patients with large glenoid bone loss.[5,19,22] Several operative procedures have been described to restore the anatomy of the glenoid.

Operative treatments for anterior shoulder instability with significant glenoid bone loss can be classified into 4 types: coracoid transfers, bone grafting, osteochondral allograft, and osteochondral autograft.[25] Glenoid restoration techniques that include the use of a tricortical iliac crest graft or the transfer of the coracoid process may be followed by osteoarthritis.[14] Fresh osteochondral allograft supplies articular cartilage replacement with the possibility of graft resorption. Osteochondral autograft also provides articular cartilage replacement, and moreover, does not have the risk of antigenicity. Although distal clavicular autograft[25] is the only procedure reported for osteochondral autograft thus far, it sacrifices the acromioclavicular joint. We thought that it would be desirable to harvest an articular cartilage with bone at the nonarticular surface as an osteochondral autograft. We present a technique for all-arthroscopic glenoid reconstruction for glenoid bone loss in recurrent anterior glenohumeral instability by using a nonarticular osteochondral autograft that does not constitute the original joint surface.

Case report

An 18-year-old right-handed girl had a history of recurrent dislocation of her right shoulder. The first dislocation occurred 18 months prior while playing dodgeball, and she underwent reduction via a bonesetter. Thereafter, she complained of instability on active elevation or external rotation of the shoulder. She presented to our clinic with right shoulder pain and more than 10 episodes of dislocation of the right shoulder 1 year from the initial dislocation.

At the time of presentation, she showed apprehension at 90° of abduction and positive results on a relocation test and anterior drawer test. Plain radiographs showed subluxation of the humeral head and glenoid bone loss. Three-dimensional reconstructed computed tomography (3DCT) showed 36.9% glenoid bone loss on the en face view by using the best-fit circle method[24] (Fig. 1). The Hill-Sachs lesion (HSL) was measured as 22.0 mm width and 7.5 mm depth on 3DCT. According to the glenoid track concept,[27] this was an off-track HSL.[11] The patient subsequently underwent all-arthroscopic glenoid reconstruction using osteochondral autograft from the contralateral lateral femoral condyle.

Surgical technique and operative findings

Examination under general anesthesia confirmed full range of motion and anteroinferior instability. The patient was placed in the

Institutional Review Board approval was not required for this case report. The patient gave informed consent for her case to be published.

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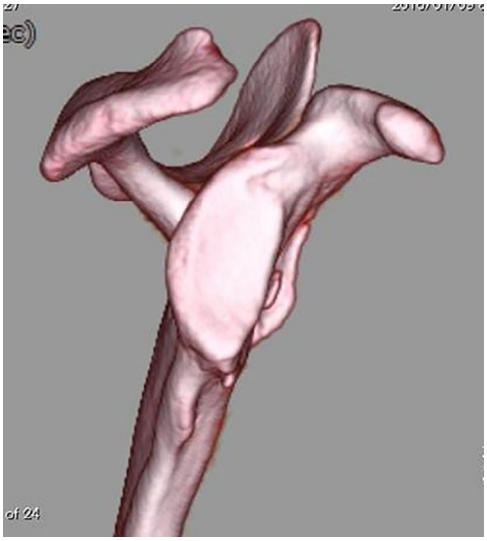

Figure 1 Preoperative 3-dimensional reconstructed computed tomography en face view of the right glenoid shows glenoid defect (bone loss, 36.9%).

beach chair position, and the shoulder, arm, and contralateral knee were prepared and draped in the standard sterile fashion. The arm was secured and held by the arm holder during the procedure.

A 30° arthroscope was inserted into the glenohumeral joint through a posterior portal. An anterior portal and anterolateral portal were established through the rotator interval. A motorized shaver was introduced through the anterior portal, and the rotator interval was débrided until the coracoid could be seen. The glenoid defect, HSL, and other intra-articular pathology were assessed with the probe. A large and deep HSL that engaged with the glenoid was observed. A large bony defect was found at the anteroinferior part of the glenoid (Fig. 2). The anteroinferior glenohumeral ligament (AIGHL) complex was almost detached from the anterior glenoid rim and had lost its tension. Adhesions between the AIGHL and glenoid rim were completely released.

The glenoid was prepared with an arthroscopic rasp and motorized shaver to create a healthy base for graft healing. The I portal was established with an outside-in technique using a spinal needle through the lateral side of the conjoint tendon from the apex of the anterior axillary fold, as described by Lafosse et al.[13] A suture anchor was inserted through the I portal into the lowest point of the bone

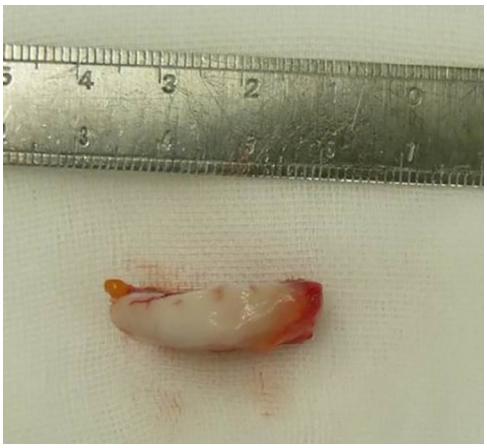

Figure 3 The osteochondral autograft was 20 mm long, 12 mm wide, and 7 mm deep. This graft was harvested from the lateral portion of the contralateral lateral femoral condyle vertex in the transverse plane to reduce the influence of harvesting.

defect of the glenoid to prepare for a Bankart repair. The anchor's suture was passed through the AIGHL for Bankart repair after graft fixation. The vertical length of the bone defect was measured.

A vertical incision was made at the lateral aspect of the contralateral patella. The skin and fascia were divided, and the lateral femoral condyle was exposed. The height of the graft was adjusted to the same height of the glenoid deficiency. The graft was harvested from the lateral portion of the vertex of the lateral condyle, including the cartilage surface and lateral wall, by using an osteotome. The graft was 20 mm long, 12 mm wide, and 7 mm deep (Fig. 3). The autograft was contoured to fit the joint surface and to restore the original shape of the glenoid.

The graft, gripped by the grasper, was inserted into the joint through the expanded anterior portal. A 70° arthroscope was used to visualize the junction of the graft and bone defect. The graft was guided to the most suitable place for joint surface reconstruction and was fixed with 2 Herbert screws anteriorly to posteriorly (Fig. 4). Because the articular cartilage of the femoral condyle covers from the patellofemoral joint surface to a part of the lateral wall, this osteochondral autograft has an articular cartilage not only at the glenoid surface but also at the distal part of the anterior wall of the reconstructed glenoid. One of the screws was inserted superolaterally, from the anterior cartilage side of the graft, and the other inferomedially, from the anterior bony side. The previous suture was

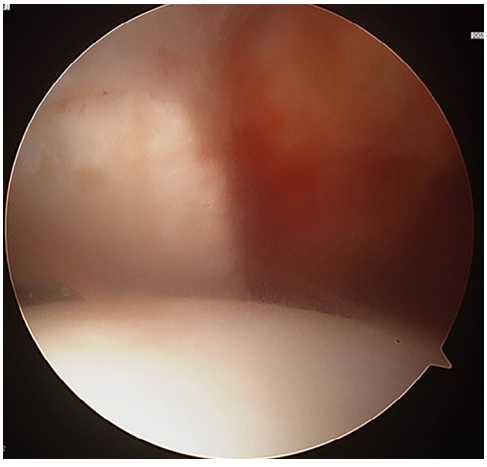

Figure 2 Arthroscopic view from the anterolateral portal shows significant bone loss of the glenoid.

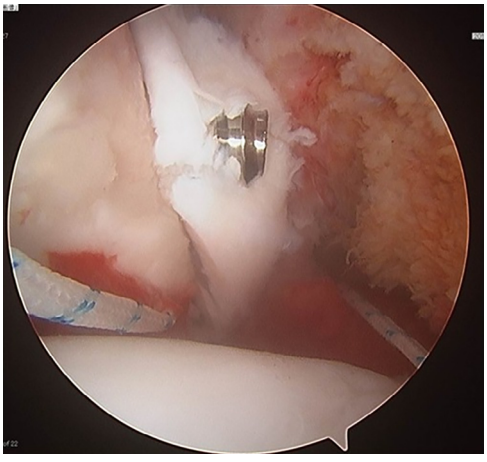

Figure 4 The osteochondral autograft was fixed with a Herbert screw. The lower suture for the Bankart repair is visible.