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Case report

Reverse Hill-Sachs lesion with a greater and lesser tuberosity fracture of the humerus due to posterior shoulder dislocation: A case report

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ABSTRACT

Reverse Hill-Sachs lesions are occasional complication of posterior shoulder dislocation. However, Isolated fractures of the lesser tuberosity humerus are rare, occurring in only 0.46 persons per 100,000. A lesser tuberosity fracture with a reverse Hill-Sachs lesion on the humeral head is an extremely rare case presentation. We present a case of a greater tuberosity fracture of the humeral head by posterior dislocation in addition to a lesser tuberosity fracture with a reverse Hill-Sachs lesion. To our knowledge, this is the first case report of a reverse Hill-Sachs lesion with a greater and lesser tuberosity fracture of the humeral head due to posterior shoulder dislocation.

Posterior shoulder dislocation occurs infrequently, accounting for 2–5% of all shoulder dislocations. It occurs when extreme muscle contractions, such as seizures, electrical shocks, or trauma injury, accompany shoulder flexion, adduction, and internal rotation.[1] Typical clinical features of posterior shoulder dislocation include posterior protrusion of the humeral head with a flattened anterior shoulder contour and a limited range of motion in shoulder external rotation, internal rotation, and forward elevation.[1] However, unlike that in anterior shoulder dislocation, minimal definite deformity of the shoulder girdle may occur. Thus, posterior shoulder dislocation cannot be detected on primary physical examination.[2]

Reverse Hill-Sachs lesions are occasional complications of posterior shoulder dislocation.[1,2] However, isolated fractures of the lesser tuberosity of the humerus are rare, occurring in only 0.46 persons per 100,000.[3] A lesser tuberosity fracture with a reverse Hill-Sachs lesion of the humeral head is an extremely rare case. In addition to this scenario, our case was accompanied by a greater tuberosity fracture of the humeral head by posterior dislocation. To our knowledge, this is the first case to report a Reverse Hill-Sachs lesion with greater and lesser tuberosity fractures of the humeral head due to posterior shoulder dislocation.

1. Case report

A 57-year-old man visited the emergency room with left shoulder pain that developed after falling down. The mechanism of injury included the arm in a position with the shoulder flexed, in adduction and internal rotation. Physical examination revealed general tenderness in the left shoulder, and other tests, including a test for the range of motion (ROM), were not performed because of shoulder pain. Plain radiographs of the left shoulder showed displaced lesser tuberosity fragments in the anterior-posterior view and axial view (Fig. 1-A,B), However, the other fractures were not clear in the plain radiography. Computed tomography revealed articular fractures that impacted the humeral head and displaced fractures of the greater and lesser tuberosities (Fig. 1-C). Magnetic resonance imaging showed a posterior labral tear and articular impaction of the humeral head (Fig. 1-D). From the imaging datas, a reverse Hill-Sachs lesion and greater and lesser tuberosity avulsion fractures due to posterior shoulder dislocation was assumed. One day after the trauma, we decided to perform surgical treatment because the displacement of the lesser tuberosity of the humerus was more than 10mm, and an articular impaction of more than 5mm was observed. The patient was placed in a beach chair position, and the fracture site was exposed using the deltopectoral approach. Severe comminuted fractures and impacted fractures of

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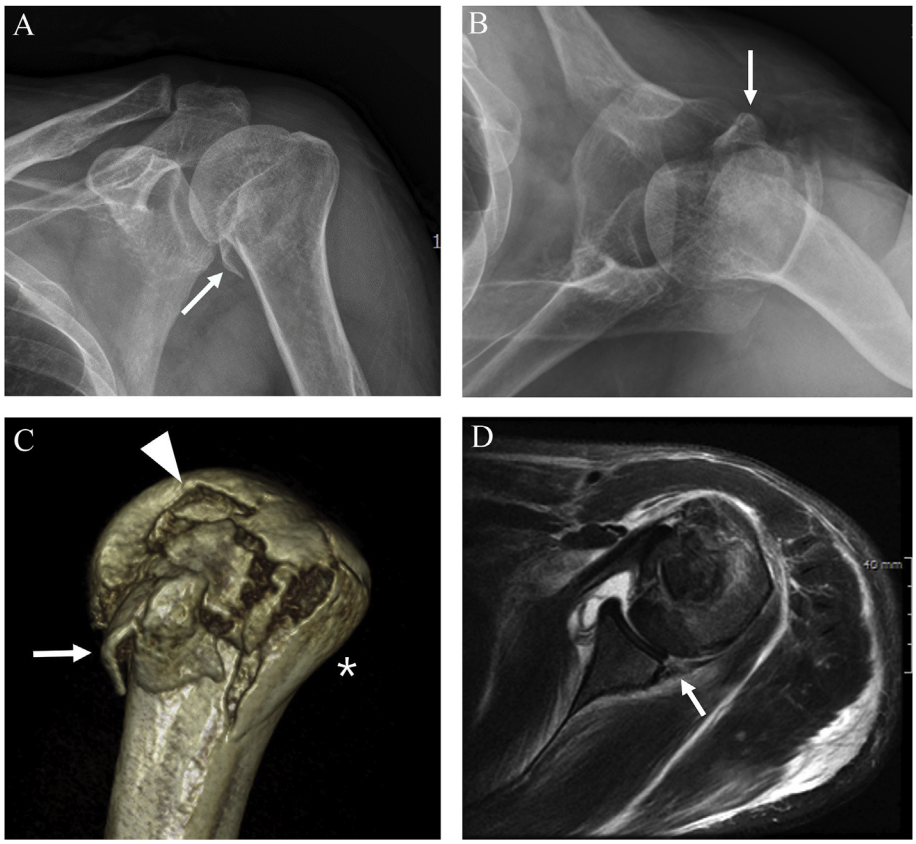

Fig. 1. Pre-operative plain radiograph of shoulder (A) Anterior-posterior view (B) Axial view. Avulsion fracture of lesser tuberosity of the humeral head (Arrow) (C) Pre-operative 3 dimensional Computed Tomography of shoulder showed impacted articular fractures of humeral head (arrowhead), the greater (asterisk) and lesser tuberosity fractures (arrow) (D) Pre-Operative T2-weighted axial magnetic sesonance imaging showed posterior labral tear.

humeral head, greater tuberosity fracture, and lesser tuberosity avulsion fracture were observed in the left proximal humerus. The articular fragments were so tiny that they could not be fixed with screws. Therefore, intra-articular fragments were reduced and temporarily fixed with K-wire. Thereafter, transosseous sutures using Polydioxanone 2-0 suture (PDS II, Ethicon, Johnson and Johnson Ltd., India) (Fig. 2-B) were placed. The greater tuberosity fragment was reduced and fixed with screw fixation using a 4.0-mm short-thread cancellous screw. Subsequently, lesser tuberosity fragments were reduced and fixed with a suture anchor using the suture bridge technique with two Y-Knot (ConMed, New York, New York) anchors and two poplok (ConMed, New York, New York) (Fig. 2-C).

2. Post-operative rehabilitation

The patient wore a shoulder immobilizer (Ultrasling ER; Donjoy, Vista, CA) that kept the shoulder at 30° of external rotation for 6 weeks postoperatively. Only pendulum exercises and scapular retraction were accepted during the period when a shoulder immobilizer was used. For the next six weeks after the immobilization period, the patient was allowed to progressively increase the range of motion and perform pain-free strength exercises. In 12–16 weeks, a more intensive strengthening exercise regimen was allowed, and the patient was able to return to work.

3. Clinical outcomes

The patient showed remarkable progress through his postoperative recovery and rehabilitation. He recovered well for 6 months after discharge and returned to daily life and work without pain. The pseudoparalysis, external rotation lag sign, and horn-blower's sign were all negative, and the visual analogue scale score at the last follow-up was 2 of 10. In the 12 months after surgery, the patient achieved full range of motiong of the shoulder (Fig. 3) and bony union was observed via plain radiography (Fig. 4). Moreover, the American Shoulder and Elbow Surgeon score was 96.7 of 100 and the Korean shoulder scoring system was 97 of 100, both of which represented the patient's excellent prognosis.

4. Discussion

Posterior dislocation of the shoulder is a rare injury and can result in complications such as reverse-hill sacs lesions.[1] Posterior shoulder dislocation is known to occur with extreme muscle contraction such as seizures, electrical shocks, or trauma injury with shoulder flexion, adduction, and internal rotation. Avulsion fractures to the lesser tuberosity of the humerus occur infrequently[3] and, isolated avulsion fractures of the lesser tuberosity of the humerus are known to occur due to traction of the subscapularis muscle by acute abduction and external rotation force in the upper arm. In addition, when an axial load is applied to the long axis of the humerus, in the position of upper arm extension and external rotation, a fracture can develop because of the increased tension of the subscapularis muscle and the superior glenohumeral ligament.[4] However, Liu et al. [5] reported that a lesser tuberosity fracture occurred with posterior shoulder dislocation. A reverse Hill Sachs lesion and lesser tuberosity fracture of the humerus with

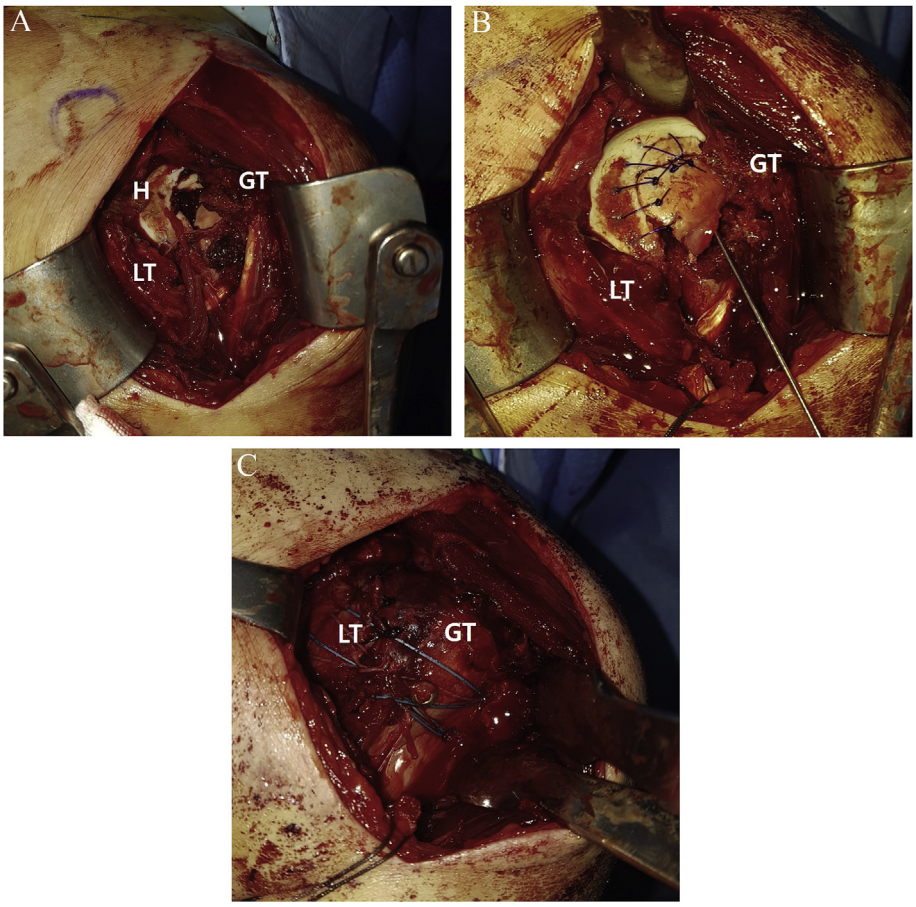

Fig. 2. Intraoperative findings. (A) Severe comminuted and impacted fracture of humeral head, greater tuberosity fracture and lesser tuberosity avulsion fracture were observed. (B) Intra-articular fragments were reduced and temporarily fixed with K-wire. Thereafter, those were fixed using the transosseous suture with Polydioxanone 2-0 suture (C) Lesser tuberosity fragment was reduced and fixed with suture anchor by the suture bridge technique. H: Humerus, GT: Greater tuberosity, LT: Lesser tuberosity.

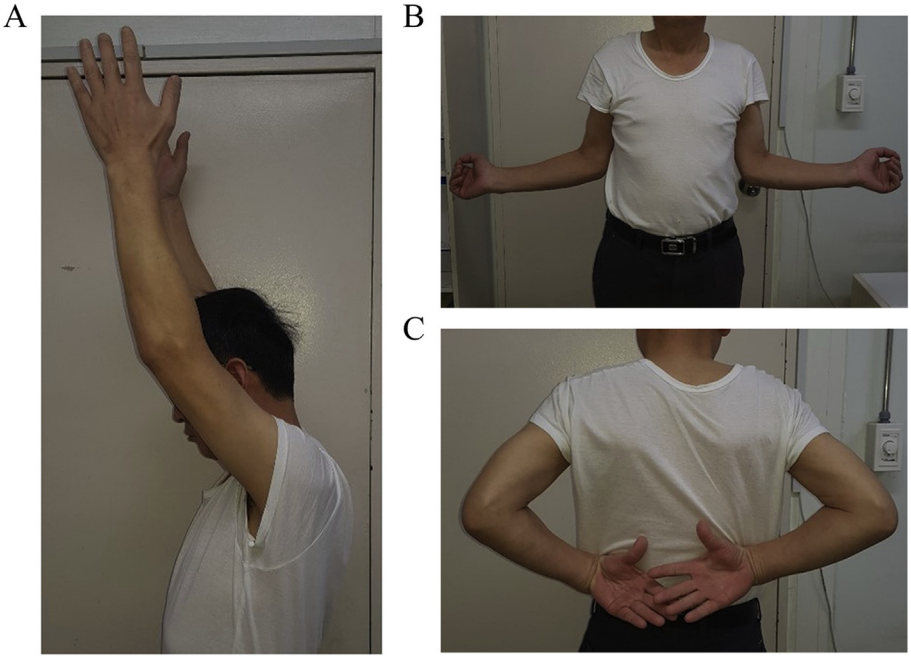

Fig. 3. Range of motion of the shoulder joint was measured in the 12 months after surgery. Full ranges were observed in forward elevation, external rotation, internal rotation of both shoulder joints.

Fig. 4. Plain radiograph in 12 months after surgery showed bony union of fracture site.

simultaneous posterior dislocation is an extremely rare case. Furthermore, a fracture of the greater tuberosity of the humerus also existed in our case. However, the diagnosis of a reverse Hill-Sachs lesion can be missed, because it is not often seen on plain radiography.[6] Recently, Computed tomography could be helpful for evaluation the exact state of fracture pattern. Furthermore, Magnetic resonance imaging is useful to figure out the accompanied the tendons and ligamentous injuries, especially in the lesser tuberosity avulsion fracture. [3,5,7] Taking these into account, if there are fractures in the greater and lesser tuberosity of the humeral head, it is important to not only classify the fracture pattern, but also to evaluate and understand the injury mechanism.

The treatment of a reverse Hill-Sachs lesion and lesser tuberosity fracture is controversial. Pace et al. [8] treated small lesser tuberosity fractures with minimal displacement by conservative management using a collar for 12 weeks. In the other studies, reattachment of the lesser tuberosity with rotator cuff repair has been advised for displaced fractures. [6,8] For reduction of the articular bone fragment, we detached lesser tuberosity fragments and then reattached them, similar to the technique followed of Demirel et al. [9] For the reverse Hill-Sachs lesion with posterior shoulder dislocation, Guehring et al. [10] proposed a treatment algorithm that depended on the defect size and time interval between the trauma and surgery. A neglected articular fracture is associated with poor outcomes because the risk of malunion is relatively high. Therefore, precise understanding of the injury mechanism and further evaluation are needed. In our case, surgical management was determined because the impacted articular fracture was multi-fragmented, and displacement of the lesser tuberosity was more than 10 mm. Although there were other options for fixation of the small intra-articular fracture fragments, such as headless screw fixation, percutaneous pin fixation, we used transosseous suture fixation because the fracture was severe comminuted and impacted. In the case of small fragmented intra-articular fractures that can not be fixed by screws, we use the transosseous suture fixation technique, which showed good progress with satisfactory reduction and union of fractures.

References

1. Hawkins RJ, Neer 2nd CS, Pianta RM, Mendoza FX. Locked posterior dislocation of the shoulder. *J Bone Joint Surg Am*. 1987;69(1):9–18.
2. Kowalsky MS, Levine WN. Traumatic posterior glenohumeral dislocation: classification, pathoanatomy, diagnosis, and treatment. *Orthop Clin N Am*. 2008;39(4):519–533. viii.
3. Wu GB, Wang SQ, Wen SW, Yu GR. Isolated avulsion fractures of lesser tuberosity humerus: a case report and review of the literature. *Int J Clin Exp Med*. 2014;7(3):780–784.
4. van Laarhoven HA, te Slaa RL, van Laarhoven EW. Isolated avulsion fracture of the lesser tuberosity of the humerus. *J Trauma*. 1995;39(5):997–999.
5. Liu X, Zhu Y, Lu Y, Li F, Wu G, Jiang C. Clinical outcomes of two-part lesser tuberosity fracture with locked posterior shoulder dislocation treated with modified McLaughlin procedure. *Zhonghua Wai Ke Za Zhi*. 2014;52(3):184–187.
6. Shibuya S, Ogawa K. Isolated avulsion fracture of the lesser tuberosity of the humerus. A case report. *Clin Orthop Relat Res*. 1993:215–218, 1986211.
7. Earwaker J. Isolated avulsion fracture of the lesser tuberosity of the humerus. *Skelet Radiol*. 1990;19(2):121–125.
8. Pace A, Ribbans W, Kim JH. Isolated lesser tuberosity fracture of the humerus. *Orthopedics*. 2008;31(1):94.
9. Demirel M, Ersen A, Karademir G, Atalar AC, Demirhan M. Transfer of the lesser tuberosity for reverse Hill-Sachs lesions after neglected posterior dislocations of the shoulder: a retrospective clinical study of 13 cases. *Acta Orthop Traumatol Turcica*. 2017;51(5):362–366.
10. Guehring M, Lambert S, Stoeckle U, Ziegler P. Posterior shoulder dislocation with associated reverse Hill-Sachs lesion: treatment options and functional outcome after a 5-year follow up. *BMC Musculoskelet Disord*. 2017;18(1):442.