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Case Report

Atypical presentation of an inferior shoulder dislocation with an engaging Hill-Sachs lesion: A case report[☆]Leighann C. Panico^{a,*}, Trinava Roy^b, Jason Brustein^c^a Department of Orthopedic Surgery, UPMC Pinnacle, 4300 Londonderry Rd., Harrisburg, PA 17109, USA^b Rowan School of Osteopathic Medicine, 1 Medical Center Dr., Stratford, NJ 08084, USA^c Rothman Orthopaedic Institute, 2500 English Creek Ave Building 1300, Egg Harbor Township, NJ 08234, USA

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ABSTRACT

Case: Inferior shoulder dislocations (ISD) are very rare occurrences estimated to make up only 0.5% of all shoulder dislocations and are typically associated with high-energy trauma and humerus fractures. We present an unusual case of an ISD due to the absence of the pathognomonic arm posture, mimicking an anterior shoulder dislocation. After multiple failed attempts at closed reduction in the Emergency Department, orthopaedics was consulted for further evaluation. Appropriate imaging was ordered, including an axillary radiograph and CT scan, which demonstrated an ISD with an engaging Hill-Sachs lesion and displaced greater tuberosity fracture. The patient was taken to the operating room the same day and underwent a successful closed reduction utilizing intraoperative fluoroscopic imaging.

Conclusion: Early reduction of ISD is critical to preventing complications, such as axillary neuropria and brachial plexopathy. However, closed reduction of ISD is often difficult. The two-step maneuver under general anesthesia in the operating room with procedural fluoroscopy is recommended to ensure a safe, adequate, and timely reduction.

Introduction

Inferior shoulder dislocations account for 0.5% of all shoulder dislocations [1]. This infrequent injury is often due to high-energy trauma and has the highest incidence of concomitant neurovascular injury of all shoulder dislocations [2]. They are often associated with humerus fractures, rotator cuff tears, in addition to vascular and neurological injuries, which can result in significant functional deficits [2–5]. Patients will typically present with the arm in a pathognomonic abducted and locked overhead position, also known as Luxatio Erecta. In atypical presentations without this distinct arm position, ISD can mimic anterior dislocations leading to initial misdiagnosis and use of improper reduction techniques. In these cases, the distinct position of the humeral shaft is the most salient feature in making the radiographic diagnosis. We present a rare case of an ISD which clinically mimicked an anterior dislocation prior to orthopaedic evaluation, as the typical upright arm posture was absent. We detail the unique radiographic findings, as well as the recommended treatment for ISD in this case report.

The patient was informed that data concerning the case would be submitted for publication and provided consent.

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Case report

A 63-year-old male presented to the emergency department with acute left shoulder pain following an assault. On arrival, the shoulder was noted to be extended and abducted approximately 90°. Upon examination, the patient had limited shoulder range of motion, but was neurovascularly intact. Prior to orthopaedic consultation, unsuccessful closed reduction was attempted twice by the emergency room physician. Once consulted, it was determined by the orthopaedic surgeon on call based upon the prereduction radiographs that the patient sustained an ISD and an associated fracture of the greater tuberosity (Fig. 1). Additionally, computed tomography (CT) showed an ISD with an engaging Hill-Sachs lesion and a displaced greater tuberosity fracture (Fig. 2). Due to multiple failed attempts at a closed reduction in the emergency department, the patient was taken to the operating room the same day for a left ISD closed reduction under general anesthesia (GA) utilizing intraoperative fluoroscopic imaging to ensure proper reduction. A two-step reduction maneuver was successfully performed, converting the inferior dislocation into an anterior dislocation, followed by reducing the anterior dislocation into the glenohumeral joint. Postoperatively, the patient remained neurovascularly intact with no axillary nerve deficits and was placed in a shoulder immobilizer. At his four week follow up appointment, the orthopaedic surgeon offered operative treatment of the greater tuberosity fragment due to the nature of his injury. However, he was not interested in surgical intervention. Furthermore, he was subsequently lost to follow up after that visit despite multiple attempts to contact him. Long term management plans would have included magnetic resonance imaging (MRI) of the shoulder to assess the integrity of the rotator cuff, as the rate of rotator cuff tears is significant in patients this age. In addition, the orthopaedic would have referred him to physical

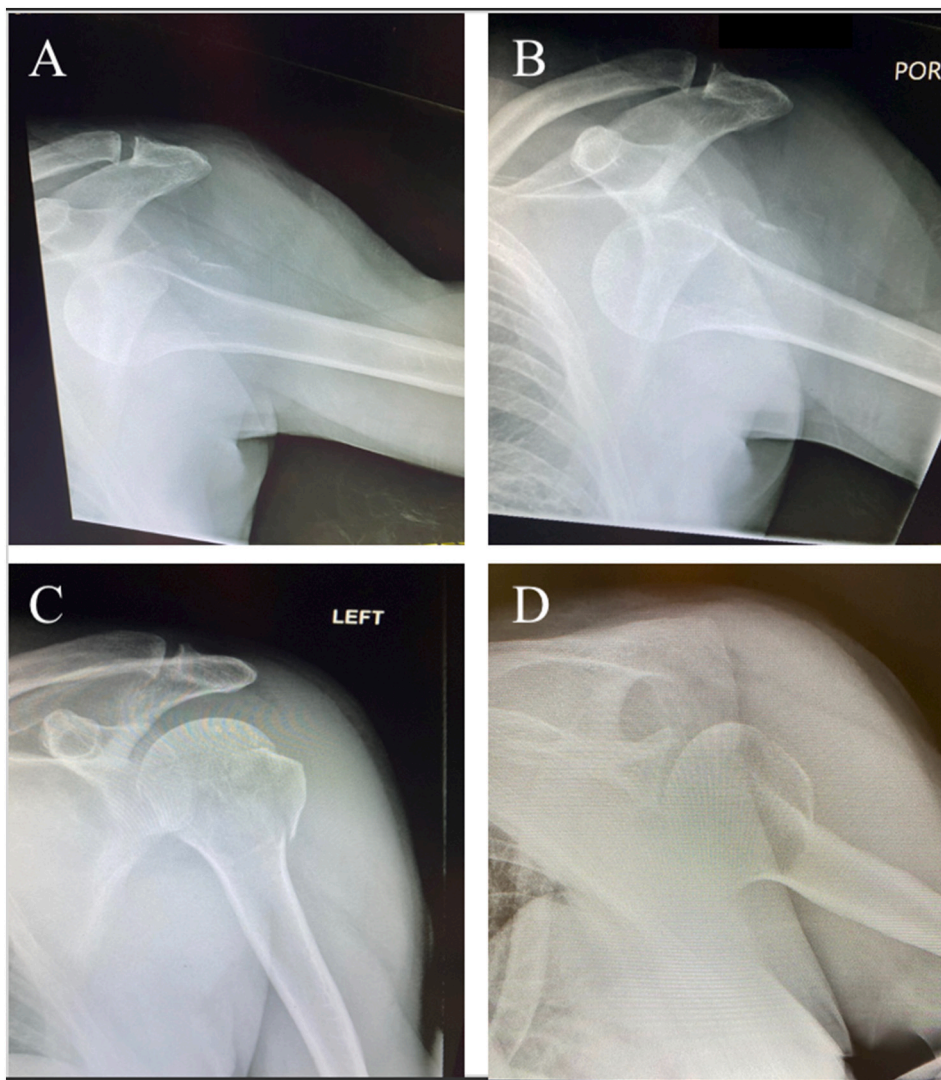


Fig. 1. Multiple views of the left shoulder demonstrating an inferior dislocation with an associated greater tuberosity (GT) fracture. (A) and (B) AP view demonstrating inferior shoulder dislocation of the glenohumeral joint with associated GT fracture. (C) Post-reduction AP radiograph demonstrating reduction of the glenohumeral joint. (D) Velpeau view demonstrating successful closed reduction of the glenohumeral joint.



Fig. 2. CT scan of the left shoulder demonstrating an engaging Hill-Sachs lesion of the humeral head and an inferior shoulder dislocation. Additionally, a greater tuberosity fracture can be appreciated lateral to the humeral head.

therapy, including a periscapular strengthening program.

Discussion

Inferior glenohumeral joint dislocations are the least common form of shoulder dislocations with an overall incidence of 1/200. All cases typically involve some form of traumatic injury with a majority being from falls (44%). Other causes, such as assault as seen with our patient, are rare and account for only 1% of cases [6].

The most common mechanism of injury for a traumatic ISD is sudden hyperabduction of an already abducted arm forcing the proximal humerus to impinge under the acromion and lever the humeral head out inferiorly from the glenoid [2]. A less common mechanism is from direct axial compression through an abducted arm with the elbow extended and forearm pronated. The distinguishing feature of a Luxatio Erecta shoulder dislocation is the abducted position of the humeral shaft parallel to the spine of the scapula [3]. They are usually more clinically apparent than other dislocations with the affected arm locked overhead. However, in atypical presentations without this distinct position, ISD can mimic anterior dislocations leading to initial misdiagnosis and a subsequent delay in treatment.

Meticulous assessment of neurovascular status is required in any form of shoulder dislocation both pre- and post-reduction. A recent systematic review noted neurological injury after traumatic ISD in 29% of cases, with the axillary nerve most at risk, and vascular injury in 10%, including axillary arterial injury [4,5]. Most neurological injuries resolve after reduction or within 1 year [6,7].

Inferior dislocations are commonly associated with soft-tissue injuries, including rotator cuff tears reported in roughly 12% of cases. Associated fractures have been found in 37% of ISD, with greater tuberosity fractures occurring in approximately 30% and Hill-Sachs lesions in 4% [8]. Our patient was found to have a fracture of the greater tuberosity and an engaging Hill-Sachs lesion of the proximal humerus. It is important to realize that because atypical presentations may be misdiagnosed, subsequent misguided reduction maneuvers can result in further neurovascular, skeletal, and soft tissue injury [2]. Therefore, we recommend obtaining a minimum of two radiographic views to categorize the direction of the dislocation, including AP and axillary or Velpeau shoulder radiographs, as well as CT or MRI to identify associated tendon, ligamentous, and osseous injuries, prior to reduction. Of note, a Velpeau view is preferred in the setting of a shoulder dislocation to decrease patient pain and morbidity.

After the diagnosis of ISD is confirmed, urgent closed reduction under GA or conscious sedation is performed. Reduction can be done utilizing one of two methods—the two-step maneuver described by Nho et al. or the traction-countertraction method by Freundlich et al. The two-step maneuver first converts the ISD to an anterior dislocation and then reduces the anterior dislocation [7]. With the patient supine, the physician places a hand on the lateral aspect of the proximal humerus and the other on the medial condyle at the elbow. Then an anteriorly directed force is applied to the humerus leveraging the humeral head from an inferior to an anterior position, while the other hand pulls the elbow in a superior direction. This is followed by adduction of the humerus towards the midline to reduce the humeral head into the glenoid [7].

Using the traction-countertraction method, the patient begins in the supine position. One physician applies in-line traction on a fully abducted arm, while countertraction is provided by an assistant pulling on a sheet across the top of the ipsilateral shoulder. The arm is gently abducted until the humeral head has been disengaged and then the arm is carried through an arc to the side of the body. Both of these reduction maneuvers have demonstrated success, with limited data on significant outcome differences [6]. However, with the traction-countertraction maneuver the physician must provide a force that overwhelms all the muscles around the shoulder, which may be difficult even with conscious sedation, and requires multiple clinicians [7]. In our case, the two-step maneuver was

successfully performed in the operating room with a single surgeon and the use of minimal force. While there is a paucity of data demonstrating significant differences between the use of GA or conscious sedation, studies have shown that closed reduction of ISD under GA results in satisfactory outcomes [8–10]. In similar cases with associated bony injuries and multiple reduction attempts, surgeons may prefer reducing complex dislocations in the operating room under GA with procedural fluoroscopy to avoid further injury to ensure a safe and timely reduction.

Declaration of competing interest

None.

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References

- [1] H. Sharma, F. Denolf, Atypical subglenoid inferior glenohumeral dislocation clinically mimicking anterior dislocation, *Eur. J. Trauma* 4 (2004) 259–261.
- [2] S.V. Sonanis, S. Das, N. Deshmukh, C. Wray, A true traumatic inferior dislocation of shoulder, *Injury* 33 (9) (2002) 842–844, [https://doi.org/10.1016/S0020-1383\(02\)00151-1](https://doi.org/10.1016/S0020-1383(02)00151-1).
- [3] S. Saseendar, D.K. Agarwal, D.K. Patro, J. Menon, Unusual inferior dislocation of shoulder: reduction by two-step maneuver: a case report, *J. Orthop. Surg. Res.* 4 (2009) 40, <https://doi.org/10.1186/1749-799X-4-40>.
- [4] A. Imerci, Y. Golcuk, S.G. Ugur, H.T. Ursavas, A. Savran, L. Surer, Inferior glenohumeral dislocation (luxatio erecta humeri): report of six cases and review of the literature, *Ulus. Travma Acil Cerrahi Derg.* 19 (1) (2013) 41–44.
- [5] M. Faizan, L. Zafar Jilani, M. Abbas, Y.S. Siddiqui, A.B. Sabir, M.K.A. Sherwani, S. Khalid, Inferior glenohumeral joint dislocation with greater tuberosity avulsion, *Chin. J. Traumatol.* 18 (3) (2015 Jun) 181–183.
- [6] M. Nambiar, D. Owen, P. Moore, A. Carr, M. Thomas, Traumatic inferior shoulder dislocation: a review of management and outcome, *Eur. J. Trauma Emerg. Surg.* 44 (1) (2018 Feb) 45–51.
- [7] S.J. Nho, C.C. Dodson, K.F. Bardzik, R.H. Brophy, B.G. Domb, J.D. MacGillivray, The two-step maneuver for closed reduction of inferior glenohumeral dislocation (Luxatio erecta to anterior dislocation to Reduction), *J. Orthop. Trauma* 20 (5) (2006 May) 354–357.
- [8] F. Yao, L. Zhang, J. Jing, Luxatio erecta humeri with humeral greater tuberosity fracture and axillary nerve injury, *Am. J. Emerg. Med.* 36 (10) (2018 Oct) 1926.e3–1926.e5.
- [9] G.I. Groh, M.A. Wirth, C.A. Rockwood, Results of treatment of luxatio erecta (inferior shoulder dislocation), *J. Shoulder Elb. Surg.* 19 (3) (2010 Apr) 423–426.
- [10] M. Diallo, A.N. Kassé, S. Mohamed Limam, J.C. Sané, B. Dembélé, M.H. Sy, Erecta dislocation of the shoulder joint—a rare injury: about four cases, *Clin. Case Rep.* 7 (7) (2019 Jul) 1319–1322.