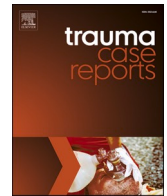




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Case Report

Glenoid labrum articular disruption in a six-year-old child: A case report

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ABSTRACT

Introduction: Traumatic anterior shoulder instability is a rare occurrence in the childhood. While glenoid labrum articular disruption itself is an uncommon condition that accompanies shoulder instability in the contact athletes, the occurrence of such lesion in a child is of extreme rarity. To the best of our knowledge, this case is the first to be reported at such a young age.

Case presentation: A six-year-old female child is presented to the clinic with a painful left shoulder and limited range of motion after a fall which was abruptly prevented by the father; hence, the child was grabbed by the arm, leaving the body to pivot around the shoulder at full force in an abduction external rotation position. Radiological studies revealed anteroinferior osteochondral fragment and a matching glenoid defect. Open surgery was performed, and the osteochondral fragment with the attached labrum was fixed using smooth K-wires.

Conclusions: Although rare, shear fractures of the anterior glenoid associated with chondral damage are possible in early childhood. However, it demands a forceful burst of abduction external rotation force which could have been avoided if the child was left to fall. The use of two K-wires via an open deltopectoral approach achieved excellent results with minimum cartilage damage.

Introduction

Anterior shoulder instability affects 1–2% of the general population. The incidence is highest among contact athletes (adolescence to early adulthood) especially rugby players ranging up to 15%. However, traumatic shoulder instability is very rare among the young population as proven by Rowe in his series of 500 dislocated shoulders in which eight (1.6%) were under the age of ten [1–4].

Generally, glenoid labrum articular disruptions (GLAD) are uncommon and found to occur in 1.5 to 2.9% with labral tears. Neviasser was the first to describe GLAD lesions and postulated that the causative mechanism is forced adduction while the shoulder is abducted and externally rotated [5]. These concomitant lesions are difficult to identify on standard MRI films and are often discovered during

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surgery. The controversy is present regarding the ideal tool for diagnosing GLAD lesions; while some authors prefer MRA (magnetic resonance arthrography) others prefer MDCT arthrography (Multi-detector computed tomography). What is agreed upon is that higher-resolution studies using contrast are the go-to modalities for the diagnosis of these hidden injuries [6–9].

The injury is typically an avulsion of the articular cartilage in line with the anteroinferior torn labrum. This occurs due to the common fibers shared between these structures [5,10]. Arthritis, post-operative failure and recurrent instability are attributed to the presence of GLAD during labral surgery as described by Pogorzelski et al. [11] Hence, several techniques were developed to treat this occurrence whether it is open or arthroscopically assisted [12–14]. In this case report, we describe the rare occurrence of a GLAD lesion in a six-year-old female child which is, to our knowledge, the youngest case to be reported.

Case presentation

A six-year-old female child is presented to the arthroscopy and sports injury clinic in our institution. Parents described the injury as the child was playing on her swing and was about to fall when the father intervened and grabbed her by the arm in Abduction External Rotation (ABER) position to prevent the fall. The child was presented with limited ROM associated with pain two weeks from the initial injury. Upon presentation, an Xray film for her left shoulder was ordered (Fig. 1a). This was followed by a CT scan of the left shoulder with 3D reconstruction and an en-face view of the glenoid (Fig. 1b). The CT scan confirmed the presence of a sizeable anteroinferior glenoid defect measuring nearly half of the glenoid surface with a displaced osteochondral fragment.

The decision was taken to perform an open reduction and internal fixation of that fragment. The deltopectoral approach was utilized combined with a subscapularis tenotomy to properly visualize and fix the fragment. The surgery was performed under general anesthesia with the patient supine in a reverse Trendelenburg position. Headless Herbert screws, small and mini fragment set screws, anchors, and K-wires were prepared.

Intra-operatively, a displaced large inferior-medial labral-cartilaginous fragment was found which was underestimated by the imaging modality as it contained a large portion of glenoid cartilage and labrum (Fig. 2).

Smooth K wires of 2.0 mm diameter were found to be the most suitable implant used in terms of easy application in such a narrow tight field and with minimum cartilage damage. An initial wire was inserted medial to the labrum as a joy-stick and the fragment was manipulated to reach appropriate reduction followed by its advancement into the glenoid. A second wire was inserted in a crossing manner to finally secure the reduction and complete the fixation (Fig. 3a, b).

Following surgery, the patient was kept in an arm sling for 6 weeks while allowing elbow and wrist motion. At 3 weeks the patient was allowed passive shoulder range motion (ROM) with a progressive course till active ROM by the end of the sixth week.

Complete union was observed after 2 months following surgery which indicated the removal of K-wires. A CT study was performed

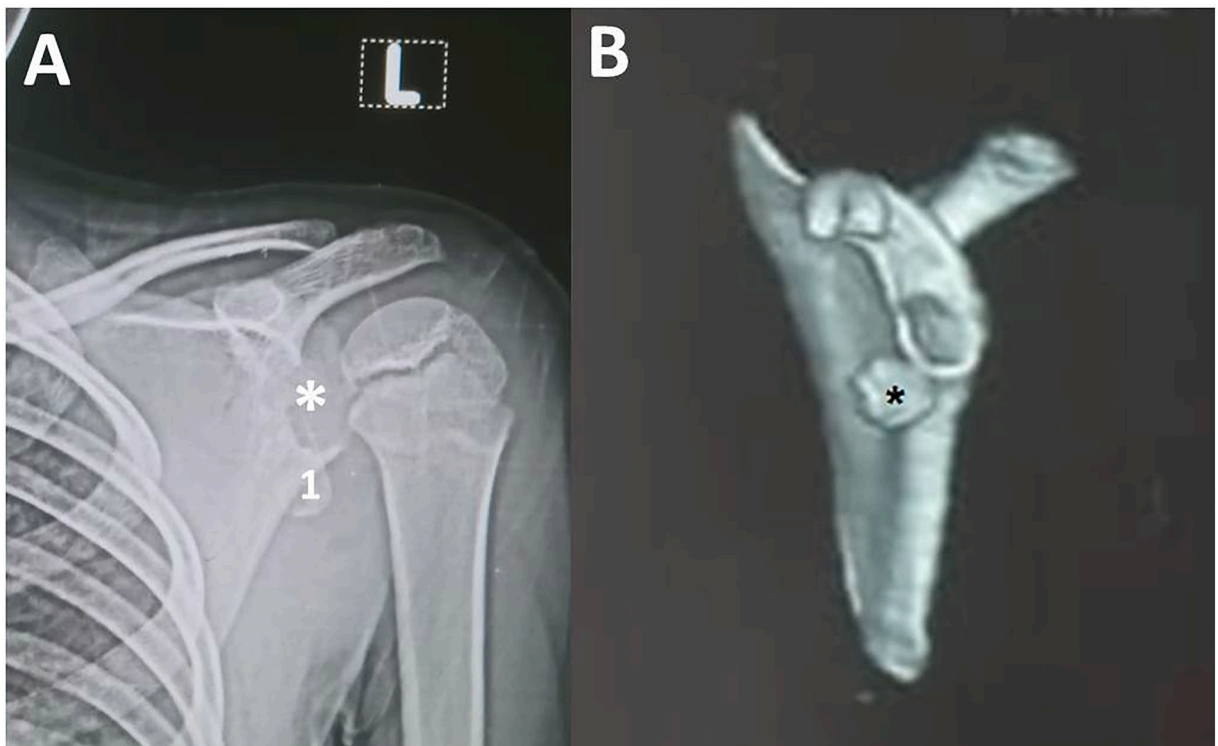


Fig. 1. Preoperative imaging. A: Standard AP view of the left shoulder with evident anteroinferior glenoid defect marked (Star) and bone fragment marked (1). B: En Face 3D CT scan view of the left glenoid showing the anterior GLAD lesion. (Star).



Fig. 2. Intraoperative view of the left shoulder showing the GLAD lesion (1- labroligamentous complex 2- osteochondral fragment 3- Glenoid 4- Humeral head 5- Subscapularis).

after the removal of implants to check the reduction and union. (Fig. 4).

At the final –consultant- follow-up at 3 months, the patient regained her complete, painless range of motion. She was observed furtherly for 14 months in the specialist outpatient clinic, with no significant change in shoulder function nor radiographic findings.

Discussion

Traumatic anterior shoulder dislocation below the age of ten is a rare occurrence as described by Rowe [2]. As stated earlier, Neviaser described the mechanism involved in the formation of GLAD as forceful adduction in an abducted and externally rotated shoulder, a typical example of which is described by the parents [5]. By grabbing the arm of the falling girl the shoulder is brought to a sudden halt in abduction external rotation (ABER), while the rest of her body travels by the effect of the inertia. As she reaches the terminal velocity she swings back to the father adding the adduction into the equation. This challenged the tough labro-ligamentous complex and caused the avulsion of the osteochondral fragment.

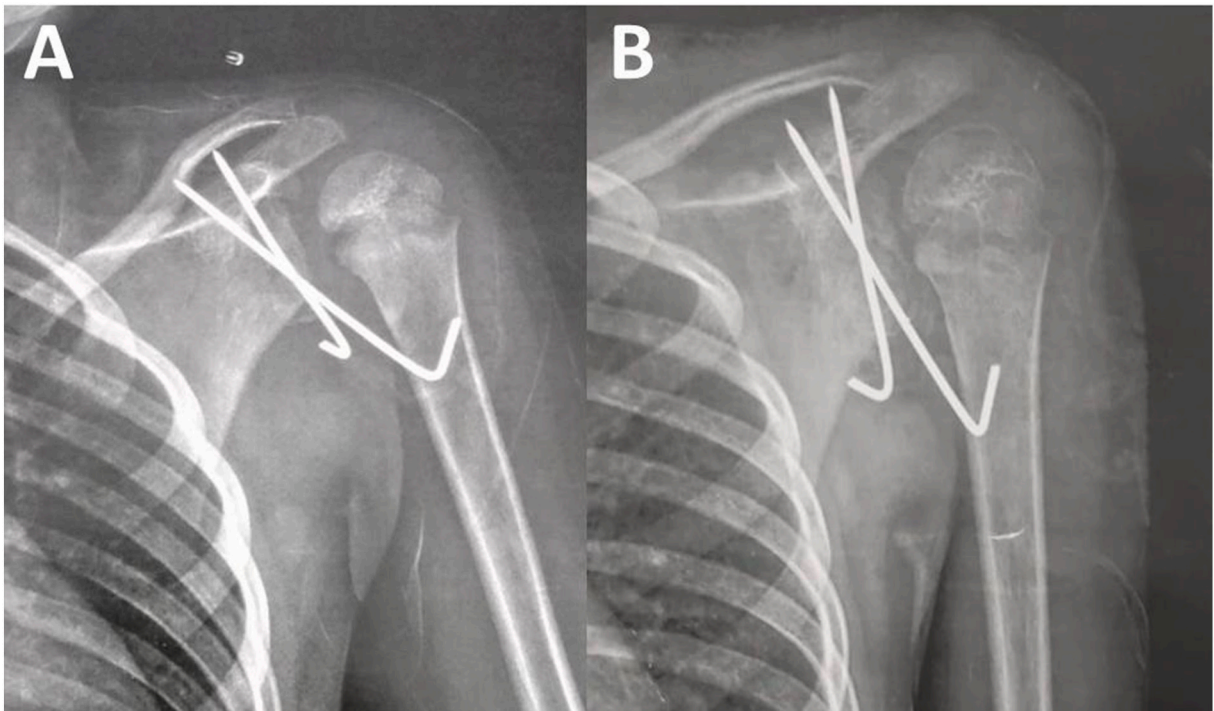


Fig. 3. Postoperative imaging. A: AP view of the left shoulder showing the immediate postoperative fixation of the bone fragment with smooth KW. B: AP view of the left shoulder showing healed GLAD lesion fixed by K-wires after 6 weeks.

Difficulties encountered in the peri-operative period were patient positioning, fracture reduction, and implant choice. As for the positioning, the beach chair position was difficult to use due to the small size of the patient, and instead, a reverse Trendelenburg position was used and proved to be adequate. Fracture reduction was difficult to achieve due to the presence of an attached labrum, ligaments and a sizeable disc of the glenoid cartilage. Hence, the K wires were the perfect method to use in this narrow field. Firstly, as joy-stick to aid reduction then as a method for fixation by advancing them into the glenoid.

The main problem with chondral lesions is the progression to shoulder arthritis. Current literature advocates several options for the management of GLAD ranging from debridement and micro-fracture for small lesions to labral advancement or even arthroplasty [14,15]. However, the main goal for the young patients is fixation. Cohen et al. [12] described their arthroscopic fixation using cannulated compression screws while Agarwalla et al. [13] used anchors in their adolescent patients. However, attempting to reproduce those arthroscopic techniques in such a young patient would have been extremely difficult.

Conclusions

Although rare, traumatic anterior shoulder dislocation associated with a shear glenoid fracture and chondral damage is possible in early childhood. Forceful ABER and adduction is the main mechanism, which can easily be prevented with proper parent education. These injuries should be included - among other preventable conditions like e.g. nursemaid's elbow- in all educational programs intended for new parents. The use of two K-wires via open deltopectoral approach and in a reverse Trendelenburg position achieved excellent results with minimum cartilage damage.

Clinical message

This article serves to shed light on rare yet potentially hazardous child trauma. It highlights the methods of diagnosis starting from history taking and up to radiological studies and includes the author's rationale in choosing the specific method of treatment. In doing so, we aim to provide a reference for surgeons who might encounter this lesion in their practice.

Consent

The parents gave their consent for this article to be published.

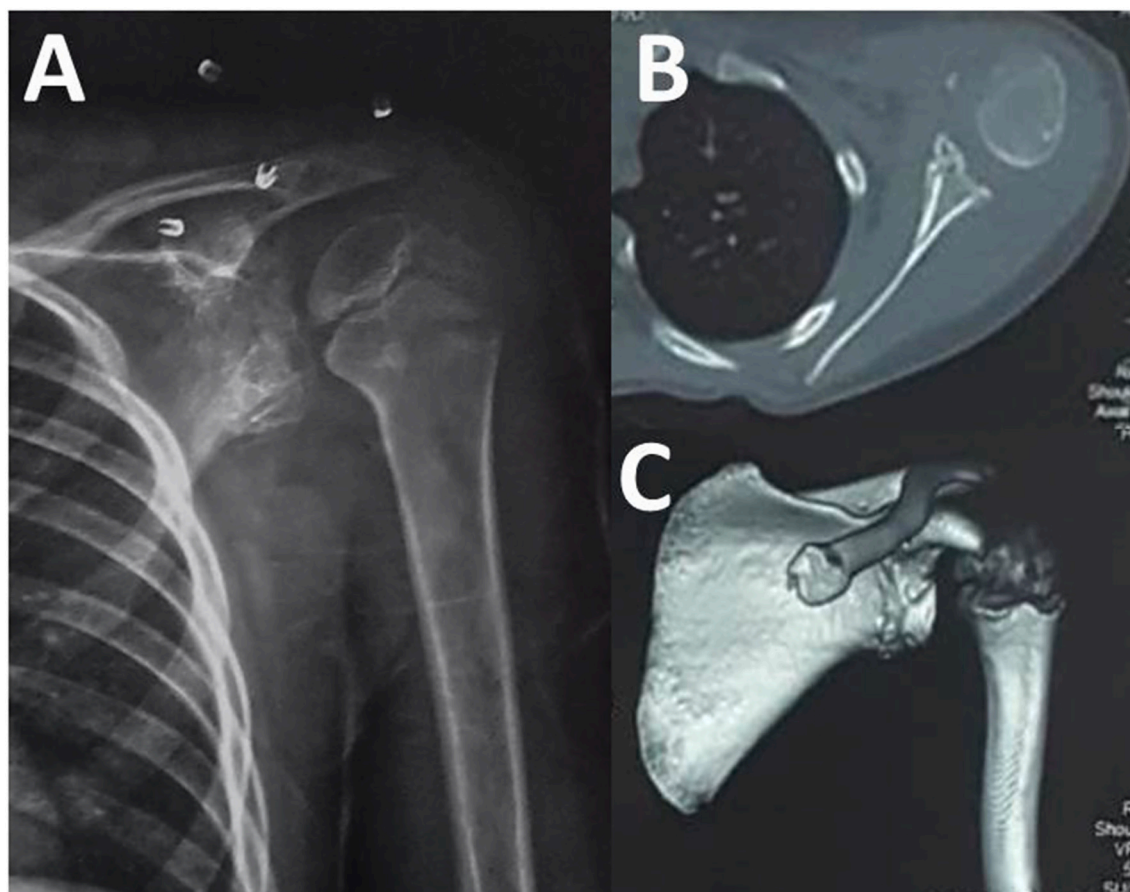


Fig. 4. Healed GLAD lesion. A: AP view of the left shoulder after removal of the KW after two months. B: Axial CT view of the left shoulder confirming successful reduction and the healing of the GLAD lesion. C: 3D CT scan of the left shoulder confirming complete union of the GLAD lesion.

CRediT authorship contribution statement

M.M and A.W planned and performed the surgery. M.G and E.A. were involved in the data collection, analysis, and manuscript drafting which was then revised, fact-checked, and modelled to the journal requirement by H.G.

Declaration of competing interest

The authors declare that they have no competing interests.

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