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Case report: pediatric posterior shoulder dislocation

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Acute, traumatic posterior dislocations of the shoulder are rare and account for 2% to 5% of all shoulder dislocations in adults.[5,8,11] This is in contrast to anterior glenohumeral dislocations, which are more common, occurring 15.5 to 21.7 times more frequently than posterior dislocations.[14] In persons younger than 10 years, traumatic shoulder dislocations in general are even more rare and account for less than 2% of all traumatic dislocations.[9] Few studies have focused on shoulder dislocation in the very young, skeletally immature patient, as most studies combine them with adolescents or both adult and pediatric patients from a heterogenous population.[9]

Several different mechanisms have been proposed for posterior shoulder dislocations. High-energy trauma with the shoulder in adduction, flexion, and internal rotation is the most frequent cause of posterior shoulder dislocation.[11,14] Seizures and electrocutions, although rare, have also been associated with posterior shoulder dislocations due to the unbalanced contraction of the shoulder muscles.[4,16]

It has been reported that diagnosis of posterior shoulder dislocations is often missed or delayed in up to 79% of patients, and so all cases with a potential shoulder dislocation require a high level of suspicion and appropriate imaging.[15] Imaging with AP and Velpeau (or axillary, if available) radiographs have been shown to minimize the risk of missing a posterior glenohumeral dislocation.[5,8,11,14]

To our knowledge, few reports exist of an acute, traumatic posterior shoulder dislocation in a child, either with[2,6] or without fracture.[1,3,17] Here we present a case of a young child with a posterior shoulder dislocation and review the relevant literature of this rare entity.

Case details

A 7-year-old child presented to the emergency department with a high-energy right shoulder injury after landing a jump off his dirt bike. Examination of the shoulder revealed a closed injury with a palpable, posterior prominence of the proximal humerus and periscapular bruising. There was tenderness on palpation of the proximal humeral head and pain with attempted range of motion (ROM). Passive ROM revealed <20 degrees of abduction with inability to externally rotate the shoulder. The patient was distally neurovascularly intact. Radiographs showed a posterior dislocation of the glenohumeral joint (Fig. 1, *A-C*). There appeared to be a reverse Hill-Sachs lesion in the metaphysis of the humerus toward the anterior aspect involving a portion of the humeral head.

Reduction was then obtained with the patient positioned supine and placed under conscious sedation. After gentle in-line traction, pressure was applied to the humeral head in a posterior-to-anterior direction. The shoulder was initially immobilized in a sling with internal rotation; however, postreduction films showed a loss of reduction. The reverse Hill-Sachs lesion may have played a role in the loss of initial reduction. A second reduction was performed with the shoulder then immobilized in an abduction sling and approximately 10-20° of external rotation (ER). Postreduction radiographs, consisting of an AP, lateral, and Velpeau axillary views, confirmed the shoulder was satisfactorily reduced (Fig. 2, *A-C*). The shoulder was immobilized in the abduction sling for 6 weeks. Repeat X-rays at 1 and 2 weeks after the injury confirmed maintenance of reduction.

Physiotherapy was started two weeks after the injury, focusing on pendulum exercises and ROM including ER, forward elevation, and abduction to 90° out of the brace. The patient was advised to avoid internal rotation and adduction beyond neutral. Six weeks after the injury, the patient had near full ROM of his shoulder, lacking slight internal rotation and abduction compared with the uninjured shoulder, and was started on strengthening exercises with no ROM restrictions.

Queen's University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board (HSREB) approved this work (TRAQ#: 6028398).

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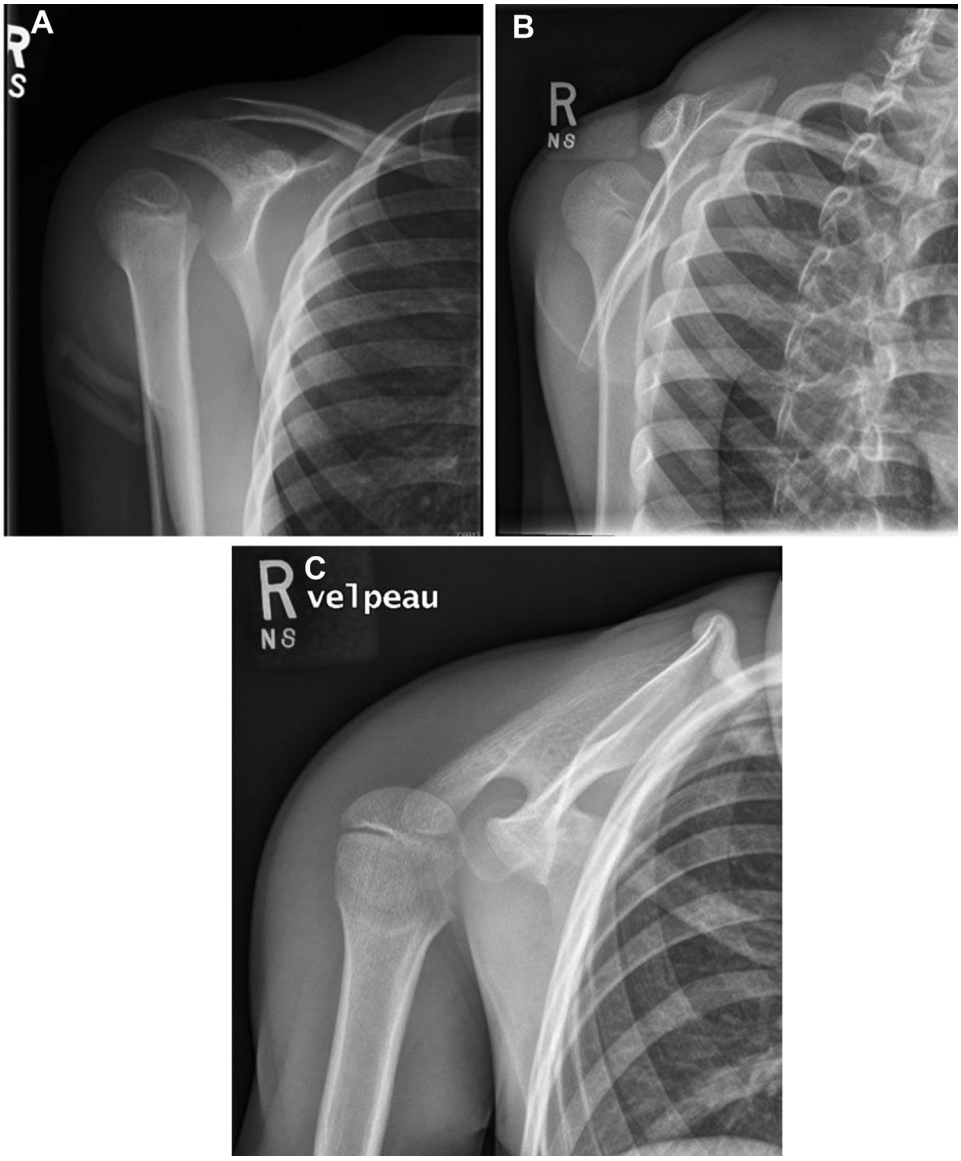

Figure 1 Radiographs taken before reduction demonstrating a posterior glenohumeral dislocation in a skeletally immature patient. (**A**) AP, (**B**) lateral view, and (**C**) velpeau view.

Repeat X-rays at 6 weeks after the injury demonstrated concerns for possible avascular necrosis with subtle subchondral sclerosis in the superior aspect of the humeral head (Fig. 3). Serial X-rays were obtained and, at eight months after the injury, there was no evidence of avascular necrosis and minimal contour irregularity (Fig. 4, *A-B*). A bony exostosis was noted to have developed at the anterior humerus on the axillary view (Fig. 4, *C*) which was asymptomatic. It was likely related to trauma due to periosteal bone healing near the reverse Hill-Sachs lesion, migrating distally away from the physis with time due to growth. The patient had returned to regular activities, was without pain, and showed excellent rotator cuff strength and shoulder ROM.

Discussion

In children, posterior shoulder dislocations may be due to congenital anomalies of the shoulder girdle, obstetrical paralysis, and voluntary dislocation in those who have general ligamentous laxity.[3] Traumatic posterior shoulder dislocations are rare and can occur by either direct high energy trauma or by indirect mechanisms causing an imbalance of the shoulder muscles. In this case, the patient sustained his injury from a high-energy traumatic mechanism.

A detailed physical examination of the patient is critical for diagnosis of a posterior shoulder dislocation. Pain is reported to be more severe compared with anterior shoulder dislocations.[3] The patient experiences very limited shoulder abduction, forward elevation, and an inability to externally rotate the shoulder. The humeral head may produce a prominence posteriorly.

Appropriate radiographic evaluation is essential to confirm the diagnosis and an axillary view is important to assess for glenohumeral subluxation or dislocation. In this patient, with limited abduction of the shoulder, an axillary view of the shoulder could not be obtained; however, a Velpeau view provided a clear demonstration of the posteriorly dislocated humeral head, also appreciated on the lateral view. The reverse Hill-Sachs lesion noted in this patient is consistent with those seen in the adult population, which are located in the anteromedial aspect of the humeral

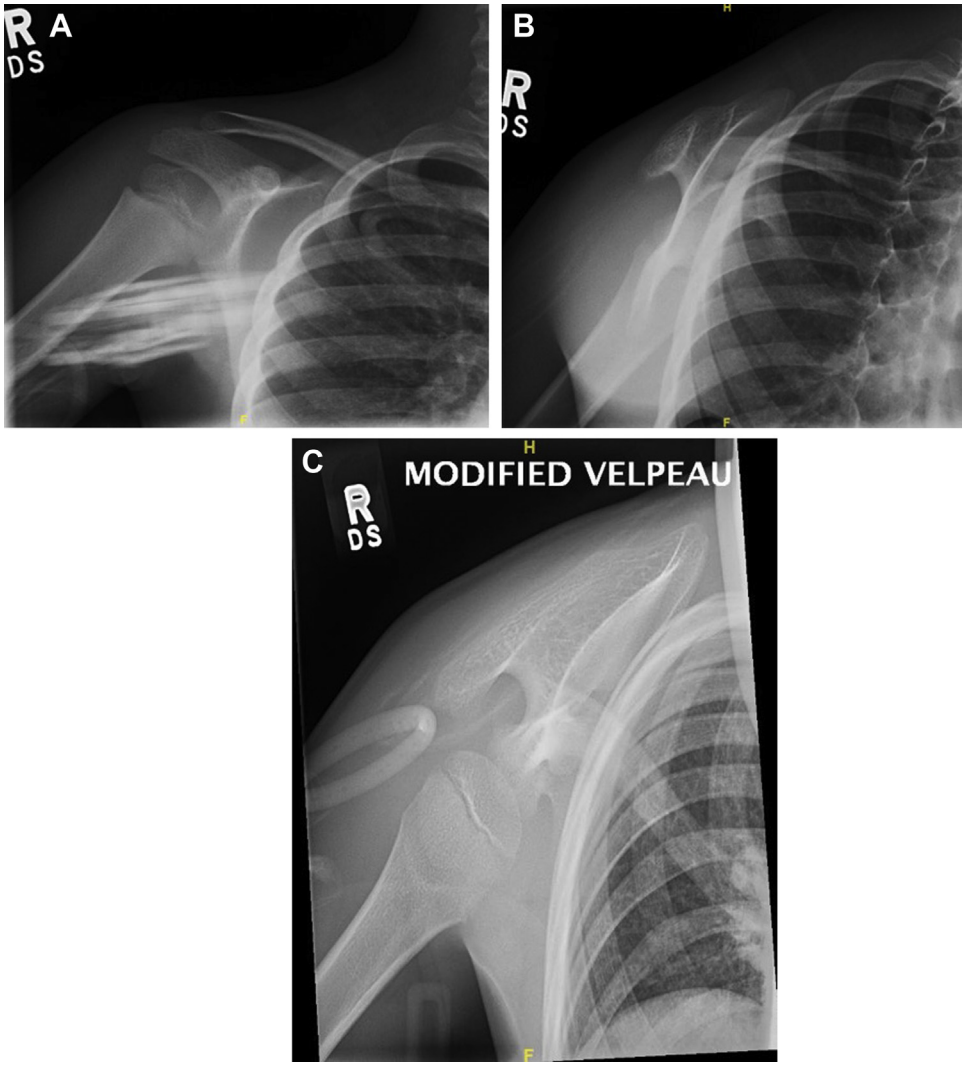

Figure 2 Radiographs taken after reduction. (**A**) AP, (**B**) lateral view, and (**C**) velpeau view.

Figure 3 Repeat X-ray at 6 weeks after the injury demonstrating subtle subchondral sclerosis in the superior aspect of the humeral head, suspicious for possible AVN.

head.[12] This lesion may engage on the glenoid in adduction and internal rotation.

Treatment for posterior shoulder dislocations involves closed reduction and immobilization. In this case, a successful reduction was achieved after 2 attempts, with reduction maintained using an abduction sling with 10-20º of ER. The new position likely resulted in the reverse Hill-Sachs lesion not engaging with the glenoid. A similar position has been used previously to maintain reduction in an adult patient with bilateral posterior shoulder dislocations associated with reverse Hill-Sachs lesions, using a shoulder spica cast in 20 degrees abduction and 15 degrees of ER for 6 weeks.[13]

The patient's shoulder was immobilized completely for two weeks, with initiation of ROM with physiotherapy out of the brace at two weeks, although using the immobilizer at all other times until 6 weeks after the injury. While this child was reliable and compliant with treatment, it may be more challenging in younger children or those less compliant. More rigid immobilization, such as a shoulder spica cast[7] may need to be considered if ongoing instability is demonstrated in the setting of poor compliance. The shoulder in this case remained stable and there was no need to proceed to operative stabilization; however, ongoing or recurrent instability may require surgical intervention. Wright et al describe a case of a 10-year-old with recurrent instability treated surgically

Figure 4 Repeat X-rays obtained eight months after injury with no evidence of AVN. (**A**) AP, (**B**) lateral view, and (**C**) axillary view, which demonstrates a small exostosis on the anterior proximal humerus.

with a glenoid-based posterior capsular shift.[17] A recent systematic review investigated traumatic shoulder instability in children younger than 18 years and suggested that those having surgical stabilization had lower rates of recurrent instability; however, the age range was broad, only 2 of 705 shoulders sustained a posterior dislocation, and they found that further studies are required to clarify several points regarding treatment.[10] A modified McLaughlin procedure could be considered in the setting of persistent instability in an adolescent patient; however, it could be problematic in a younger patient. Owing to the proximity to the physis, this would risk injury to growth, resulting in limb shortening or angular deformity. To our knowledge, there is no reported literature on a McLaughlin procedure used in the pediatric population. However, with the growth and remodeling potential observed in pediatric patients with periosteal bone healing, this defect is likely to improve over time.

Conclusion

Posterior shoulder dislocations are rare, and even more rare in the pediatric population. These injuries can be missed and thus a good history, physical examination, and appropriate imaging are essential to reach the correct diagnosis. Limited ROM due to pain on presentation can make it difficult to obtain a standard axillary view so a Velpeau view is useful in the acute setting. Positioning the shoulder in abduction and ER helps to maintain the reduction. Serial radiographs may be of benefit to monitor for sequelae.

Conflicts of interest

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Patient consent

Obtained.

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