Case Report

Traumatic pediatric shoulder fracture dislocation treated with closed reduction and intramedullary nailing: A case report

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A B S T R A C T

Background: Although rare, pediatric proximal humerus fractures may coexist with glenohumeral dislocations. Most of these injuries are Salter -Harris type of injuries. The treatment usually consists of closed or open reduction and k-wires fixation.

The case: In this case report; a 10-year-old girl presented with a rare traumatic humeral surgical neck fracture with a posterior shoulder dislocation that was treated by closed reduction and flexible intramedullary nailing.

Conclusion: Pediatric humerus fracture dislocations are rare. Treatment should keep in mind preservation of the growth plate.

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Introduction

Shoulder trauma in children can result in a variety of injuries ranging from rotator cuff strain and glenohumeral subluxation to proximal humerus fractures and joint dislocations [1].

Proximal humerus fractures represent less than 5% of all pediatric fractures. These rare injuries have an estimated annual incidence of 1.2 to 4.4 per 1000 children [2,3,4]. Usually, the physis is the most vulnerable site of fracture in the proximal humerus [4]. Due to the high remodeling rate in this part of the bone, most of these fractures (with the exception of Salter Harris types III-IV) are treated non-operatively.

Glenohumeral dislocations in the pediatric population are rare [5]. In Rowe’s classic series of five hundred shoulders in a series of 488 patients, only 8 (1.6%) of them were under 10 years of age [4]. While the exact incidence of pediatric shoulder dislocation remains unknown, there seems to be an increase in frequency in older children and adolescents [6]. The most common direction for traumatic shoulder dislocations is anterior [1]. Very rarely, posterior (less than 5%) or inferior (less than 1%) glenohumeral dislocations can occur [1].
The combination of shoulder dislocation and proximal humeral physeal fracture are extremely rare in children younger than 10 years old [7].

Here we present the unusual pediatric case of surgical humeral neck fracture with a posterior glenohumeral dislocation. Up to our knowledge, no similar case was reported in the English literature.

The case

A 10-year-old girl previously healthy, fell down from a 1 step stairs. She initially presented to a local primary health care center complaining of left shoulder pain. She was found to have a closed surgical humeral neck fracture with posterior shoulder dislocation. Closed reduction under sedation was attempted but failed. She was then transferred to our institute which is considered a level I trauma center. Upon presentation, her left arm was on an arm sling with her shoulder adducted and internally rotated and she was complaining of left shoulder pain. Both active and passive shoulder range of motion were restricted due to pain. Distal neurovascular examination was normal and there were no signs of compartment syndrome. Radiographic studies revealed a picture of left surgical humeral neck fracture with posterior shoulder dislocation (Fig. 1).

At that time the patient had completed 24 h from the initial injury. The patient was consented for closed versus open reduction and fixation and was taken to the operating room as an emergency case. Under general anesthesia, closed reduction of the shoulder dislocation was performed with difficulty and was unstable. At that time, we moved to the elbow and a posterior midline 2 cm vertical skin incision was made, then dissection carried down and the triceps tendon split in line with skin incision.

Fig. 1. A: AP (anterioposterior), B: Lateral shoulder and C: Lateral humerus X-rays demonstrating the humeral surgical neck fracture with a posterior shoulder dislocation.
With direct vision of the bony landmark, a single midline bony access 1 cm above the olecranon fossa was prepared with an owl. Under guidance of intra-operative fluoroscopy, two titanium elastic nails (TEN) of appropriate sizes were inserted and advanced to a point just beneath the fracture site. Then, one of the nails was engaged into the proximal fracture fragment and closed manipulative maneuver was done for fracture reduction. Finally, the nails were advanced into the humeral head. Acceptable alignment of the fracture was confirmed with intra-operatively with fluoroscopy images (Fig. 2).

Post operatively, to minimize pain and reduce motion, the limb was temporarily immobilized in a U shaped slab with the shoulder in neutral abduction/adduction and the elbow in 90 degrees flexion with collar and cuff. The patient had normal distal neurovascular examination and was discharged in a stable condition the following day. Follow up X-rays at 2 months confirmed that the fracture had complete union and the patient has regained full, pain-free shoulder range of motion (fig. 3). At 3 months post operatively, the patient underwent removal of the nails. Further follow up at 4 months demonstrated the patient had regained full shoulder and elbow range of motion with no pain or tenderness with negative apprehension test (fig. 4).

**Discussion**

Pediatric shoulder fracture dislocations are rare injuries. Most of these fractures are Salter Harris (SH) type II injuries \[8,9,10\]. SH type I fractures occur more commonly in younger children, whereas type III and IV fractures are very rare \[8,9,10\].

![Fig. 2. Intra-operative fluoroscopy images showing the reduced fracture-dislocation, fixed with 2 TEN. A: AP proximal humerus, B: Lateral proximal humerus & C: lateral distal humerus.](image-url)
Fig. 3. A: AP and B: Lateral shoulder x rays couple of months post operatively showed good fracture healing process.

Fig. 4. A: AP and B: Lateral humerus views 4 month as post operatively. (1 month after TENs have been removed).
Nicastro and Adair [11] described one of the earliest case reports on pediatric shoulder fracture dislocations. Their patient was a 32-month old child, suspected of being victim of abuse, who had a proximal humerus SH-I fracture with ipsilateral anterior shoulder dislocation. The fracture was treated with open reduction and Kirschner wire fixation.

The youngest age of shoulder fracture dislocation in the literature was presented by Winmoon et al. [7]. The patient was a 2-year-old boy with anterior shoulder dislocation and Salter-Harris type I fracture of the proximal humerus. They recommend that open reduction of such injuries should be reserved only for irreducible cases. Few similar cases of shoulder dislocation with ipsilateral Salter-Harris proximal humerus fracture were reported [12,13,14].

A recent case report by Hong S. et al. [15] described a posterior shoulder dislocation with ipsilateral proximal humerus SH-II physeal fracture in a 9-year-old boy. They treated the patient by closed reduction and percutaneous pinning.

Twee Do and Kim Kellar [1] described an adolescent with a transitory inferior dislocation after a proximal humerus fracture with axillary neuropraxia. They concluded that simple arm support would be sufficient to keep the joint reduced.

In our case, a trial of closed reduction with TEN is a good option that revealed an excellent result without complications.

Conclusion

Although rare, pediatric proximal humerus fractures may coexist with glenohumeral dislocations. A high index of suspicion with appropriate radiographic evaluation is needed to avoid missing or delays in diagnosis of these injuries. A trial of closed reduction and TEN fixation is a good option of treatment with excellent result.

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