



Epiphyseal Separation of the Proximal Humerus in a Newborn

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Abstract

Background: Epiphyseal detachment of the proximal humerus is a rare injury that can occur in traumatic labor. Conservative treatment is the treatment of choice for these injuries with good outcomes.

We report a case of epiphyseal separation of the proximal humerus in a newborn and discuss the problems arising in its diagnosis reviewing the literature.

Case Report: Newborn, male, 28 weeks and 3 days old, cesarean section with difficult extraction. At birth he presented with an exuberant ecchymosis of the upper left limb associated with edema and reduced mobility.

The limb was in adduction and shortened and it was evident a reduced palmar grip, in comparison with the right side. X-ray examination confirmed the position of the arm and excluded any major fractures.

Ultrasound examination demonstrated a more anterior and proximal topography of the diaphysis and the humeral head was found more posteriorly with overlap between the humeral head and the diaphysis suggesting epiphyseal detachment. Conservative treatment was the treatment of choice.

Subsequent X-ray examination showed healing of the epiphyseal separation and good alignment of the upper extremity. At 12 months old the patient has regained total movement and strength of the left upper extremity.

Conclusions: Epiphyseal separation of the proximal humerus should be considered in the differential diagnosis of neonates with traumatic labors who have limitations on the motion of the upper extremity. The diagnosis may be difficult to make with plain radiographs. Ultrasound on the other hand, can accurately make the diagnosis confirming the epiphyseal detachment. Conservative treatment is the treatment of choice for these injuries with very good results.

Keywords: Epiphyseal Detachment; Proximal Humerus; Neonates; Traumatic Labor

Introduction

Epiphyseal detachment of the proximal humerus is a rare injury that can occur in traumatic labor [1-3].

There are only a few cases described in the literature concerning epiphyseal separation of the proximal humerus after birth. The majority of the cases described are in older children.

As a biomechanically weak location, the physis can suffer detachment when a greater force is applied.

We are going to describe the case of a male neonate, delivered by cesarean section with a difficult extraction that led to a trau-

matic birth injury of the proximal humeral growth plate.

Case Report

Newborn, 28 weeks and 3 days old, cesarean section due to fetal rate drop with difficult extraction. Apgar score at birth were 5, 7, and 8. Examination in the Neonatal department revealed reduced left arm motion associated with swelling, ecchymoses and tenderness to palpation. He was referred to the Orthopaedic department that documented little spontaneous mobility and reduced palmar grip, in comparison with the right side (Figure 1).

X-ray examination of the chest performed in the Neonatology department showed the arm in adduction and shortened compared

to the right side. (Figure 2) Ultrasound (US) examination demonstrated a normal epiphyseal-metaphyseal humeral relationship on the right side and on the left an ossified humeral diaphysis was identified in a more anterior and apparently proximal topography, and the humeral head was found more posteriorly, with overlap between the head (more posterior) and the diaphysis (more anterior) suggesting epiphyseal detachment (Figure 3 and 4).

The left shoulder was placed in a sling for a week; after that movement of the arm was encouraged with a favorable clinical evolution (Figure 5-7).

Subsequent X-ray examination demonstrated healing of the epiphyseal separation with good alignment of the upper extremity (Figure 8).

At 12 months old the patient has regained total movement and strength of the left upper extremity (Figure 9-11).

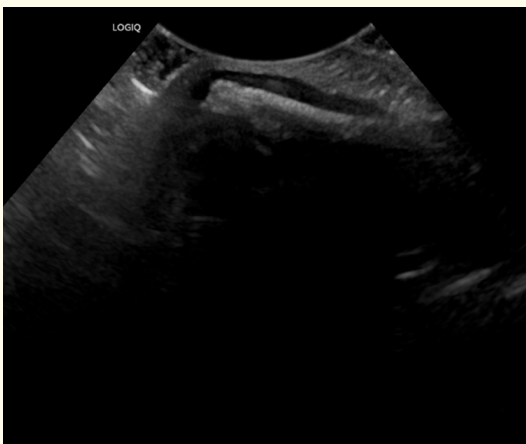


Figure 3: US image where we can see the anterior position of the diaphysis of the left humerus.



Figure 4: US image where we can identify the posterior position of the diaphysis of the left humerus.



Figure 1: Position of the arm when referred to orthopaedic department.



Figure 2: Arm placed in adduction and shortened compared to the right side.



Figure 5



Figure 6



Figure 5-7: Patient spontaneously and comfortably moving the upper extremity after 1 week of conservative treatment with a sling.



Figure 8: Good alignment of the left humerus; congruence between the glenoid, the humeral head and the diaphysis.



Figure 9



Figure 10



Figure 9-11: At 12 months old the patient has regained total movement and strength of the left upper extremity.

Discussion

This clinical case describes a case of epiphyseal detachment of the proximal humerus which is a rare injury that occurred after a traumatic labor.

Epiphyseal separation can happen in many scenarios: in obstetric maneuvers, with traumatic deliveries assuming the higher risk; cesarean sections, due to excessive traction or even in nonaccidental traumas (rotational force/twisting).

The growth plate is an important structure for longitudinal bone growth and, when a lesion is sustained, it can allow bone remodeling that will occur more rapidly in the plane of the joint motion. In the upper extremity, remodeling is more active in the proximal humerus and distal radius.

In this type of injuries, neurovascular examination is very important, being essential to check brachial plexus nerve function as well as perform an accurate vascular examination, which were normal in our patient.

The physeal plate is less resistant to trauma in infants and children than are the joint capsule, bone and ligaments [2].

Therefore, the path of least resistance of forces applied to the extremities is through the cartilaginous physis. When there is a difficulty delivery the force applied may be through the proximal humeral physis leading to epiphyseal separation [2].

The epiphysis displacement occurs due to abduction and external rotation (rotator cuff muscles) and the shaft displaces anteriorly due to adduction and shortening due to the pectoralis major and deltoid muscles.

The diagnosis of epiphyseal separation in a neonate is difficult. Physical examination allows us to suspect the diagnosis but plain radiographs may be misleading due to the unossified epiphysis [2,5]. Direct visualization of the non-ossified structures by US is needed.

The ultrasound is a noninvasive exam and can identify the ossification center, even if it is purely cartilaginous. The relationship between the epiphysis and metaphysis can also be identified. In addition, the relationship of the ossification center with the glenohumeral joint can also be easily evaluated [2,5].

Treatment of epiphyseal separation is usually conservative. The prognosis for adequate healing and no residual deformity is excellent as there is little or no vascular compromise of the epiphysis [2,4,5].

In the presented case there is no evidence of a vascular necrosis or collapse and there is a good alignment of the left humerus and congruence between the glenoid, the humeral head and the diaphysis at 12 months old is shown. Despite this fact, proximal humerus physis closes at 14 to 17 years-old in girls and at 16 to 18 years-old in boys and it is known that 80% of humerus growth comes from the proximal physis so it is essential to maintain follow-up.

Conclusion

Separation of the proximal humeral epiphysis should be considered in the differential diagnosis of the neonate with birth trauma who has limitation of the upper extremity motion. The diagnosis may be difficult to make relying on solely plain radiographs.

Early diagnosis is important to avoid complications and ultrasonography can serve as a guide for treatment as it is a non-invasive exam that can accurately make the diagnosis.

Treatment is usually nonoperative in younger patients due to the remodeling potential of the proximal humerus with very good results.

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