A Shearing Osteochondral Fracture of the Humeral Head Following an Anterior Shoulder Dislocation in a Child

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Abstract A dislocation of the shoulder joint is rare in children with an open physis. The fractures associated with an anterior dislocation generally reported in the literature have been Hill-Sachs lesions, avulsions of the greater tuberosity and glenoid fractures. We present a case of a previously unreported shearing osteochondral fracture, which is distinct from a classic Hill-Sachs lesion of the humeral head, in 12-year-old boy. The patient suffered a traumatic anterior shoulder dislocation with a spontaneous reduction along with this associated fracture. The fracture subsequently healed with no further evidence of persistent instability.

Key words shoulder dislocation • pediatric • humerus fracture

Introduction

Most injuries around the shoulder in children involve the proximal humeral physis or metaphysis [1]. Consequently, shoulder dislocations in children are rare [2–11]. When a dislocation of the shoulder does occur, whether in an adult or child, the potential fractures most commonly associated with this injury are posterolateral compression

fractures of the humeral head (Hill-Sachs lesions), greater tuberosity fractures, and glenoid rim fractures (bony Bankart). We describe a case of an osteochondral fracture of the humeral head associated with an anterior shoulder dislocation in a child.

A Case Report

A 12-year-old right-hand-dominant boy injured his right shoulder while playing football. He described slipping and falling onto the right arm, after which he had shoulder pain and was unable to move the right shoulder. He was treated in a local emergency room, where plain radiographs of his right shoulder were obtained, and he was placed in a sling. Three days later, the boy visited our institution where an examination of the right shoulder revealed moderate swelling and mild tenderness to direct palpation of the

Fig. 1. Right shoulder anteroposterior radiograph shows an osteochondral fracture involving the far medial margin of the greater tuberosity of the humerus. A free bony fragment (arrow) is superiorly displaced.

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lateral aspect of the shoulder. The shoulder range of motion was as follows: active forward elevation, 20°; active abduction, 20°; passive forward elevation, 90°; and passive abduction, 60°. The axillary nerve was intact to motor and

Fig. 2. Oblique coronal fat-saturated T2-weighted FSE **a** and oblique coronal FSE **b** images show an osteochondral shearing fracture (arrows) just anterior from a classic Hill-Sachs lesion displacing both the subchondral bone and a portion of the far medial margin of the supraspinatus tendon foot print. There is no free retraction of the cuff. Axial FSE image **c** shows an anteroinferior labral tear (arrow).

Fig. 3. The follow-up shoulder anteroposterior radiograph shows a completely healed osteochondral fracture without displacement.

sensory examination. The plain radiographs of the right shoulder taken from the day of injury demonstrated an isolated osteochondral fracture of the right humeral head (Fig. 1).

For a clarification of this fracture, magnetic resonance (MR) imaging of the right shoulder 18 days after the injury was performed using a 1.5-T magnet (Twin speed; General Electric Health Care, Milwaukee, WI, USA). All the images were obtained using a phased-array shoulder coil (Shoulder PA, MedRad, Indianola, PA, USA). The right shoulder was positioned in the supine, neutral position. Oblique coronal frequency-selective fat saturated fast spin-echo (FSE), [4000/56 (TR ms/TE ms)], as well as oblique coronal, oblique sagittal, and axial proton FSE images [4000/26–28 (TR ms/TE ms)] were acquired. The field of view ranged from 14 to 16 cm. The slice thickness was between 3 and 4 mm with no interslice gap. Imaging matrix was 512×224 to 512×384 pixels.

The MR images showed the sequela of an anterior dislocation, with a Bankart lesion, torn anterior capsule at the glenoid, and an osteochondral fracture immediately anterior to the region of a classic Hill-Sachs lesion (Fig. 2). There was also a partial tear of the lateral attachment of the posterior capsule. Follow-up radiographs taken 2 days after MRI study showed that the right humeral head fracture had begun to heal without further displacement. An additional 2 weeks of immobilization and use of a sling was recommended. Follow-up radiographs taken at 5 weeks after the injury showed that the fracture was fully healed. The boy underwent physical therapy focusing on strengthening of the rotator cuff muscles and was restricted from athletics for an additional 2 months.

Three months after the injury, the boy returned for a follow-up. His right shoulder was pain free and his range of motion and strength were full. There was no instability in the right shoulder and the apprehension sign was negative. Radiographs of the right shoulder showed a completely healed osteochondral fracture (Fig. 3).

Discussion

A review of the literature reveals that documented cases of shoulder dislocation are rare in pediatrics [2–11]. It has been reported that a Salter type II fracture of the proximal humerus is more common than a shoulder dislocation [4, 8]. Wagner and Lyne [9] reported that the incidence of a shoulder dislocation in adolescents with an open physis was 4.7% and Rowe [12] noted that the incidence was 19.8% in patients younger than 20 years. When dislocations of the shoulder occur in children, it is typically after closure of the proximal humeral physis [1].

Fractures associated with an anterior shoulder dislocation have been reported in children. These include a depression fracture of the posterolateral humeral head (classic Hill-Sachs lesion), avulsion of the greater tuberosity, fracture of anteroinferior glenoid rim (bony Bankart) and fractures involving the proximal humeral physis (Salter-Harris types I, II and III) [5, 7, 8, 10, 11–14]. Lawton reported that out of 26 children younger than 16 years old who suffered a fracture associated with an anterior shoulder dislocation, 16/26 (62%) had a Hill-Sachs lesion on a radiographic review [5]. What made our case especially unique is that in addition to the traumatic anterior dislocation, there was a shearing osteochondral fracture of the humeral head in the immature skeleton.

To our knowledge, our case is the first report of a shearing osteochondral injury to the humeral head associated with a traumatic anterior shoulder dislocation in a skeletally immature individual. The recognition of this injury is important for those physicians treating children because dislocations are not usually suspected in children with injuries about the shoulder. When this fracture is seen on radiographs after a shoulder injury, one must be highly suspicious of an anterior dislocation with a spontaneous reduction. In this case, MR imaging allowed clarification of

the diagnosis. The patient was subsequently managed as one would a young patient with a first-time traumatic dislocation. Although a rare injury, recognition of this radiographic sign and this injury pattern will facilitate proper management, yielding optimal outcome.

References

1. Rang M (1974) Children's fractures. Lippincott, Philadelphia, PA, pp. 87–92
2. Elbaum R, Parent H, Zeller R et al. (1994) Traumatic scapulo-humeral dislocation in children and adolescents. A propos of 9 patients. *Acta Orthop Belg* 60:204–209
3. Endo S, Kasai T, Fujii N et al. (1993) Traumatic dislocation of the shoulder in a child. *Arch Orthop Trauma Surg* 112:201–202
4. Heck CC (1981) Anterior dislocation of the glenohumeral joint in a child. *J Trauma* 21:174–175
5. Lawton RL, Choudhury S, Mansat P et al. (2002) Pediatric shoulder instability: presentation, findings, treatment, and outcomes. *J Pediatr Orthop* 22:52–61
6. Marans HJ, Angel KR et al. (1992) The fate of traumatic anterior dislocation of the shoulder in children. *J Bone Joint Surg Am* 74:1242–1244
7. Nicastro JF, Adair DM (1982) Fracture-dislocation of the shoulder in a 32-month-old child. *J Pediatr Orthop* 2(4):427–429
8. Obremskey W, Routt ML (1994) Fracture-dislocation of the shoulder in a child: case report. *J Trauma* 36(1):137–140
9. Wagner KT, Lyne ED (1983) Adolescent traumatic dislocations of the shoulder with open physes. *J Pediatr Orthop* 3(1):61–62
10. Winmoon C, Sathira-Angkura V, Kunakornsawat S et al. (2003) Fracture-dislocation of the glenohumeral joint in a 2-year-old child: case report. *J Trauma* 54(2):372–375
11. Cohn BT, Froimson AI (1986) Salter 3 fracture dislocation of glenohumeral joint in a 10-year-old. *Orthop Rev* 6:97–98
12. Rowe CR (1956) Prognosis in dislocations of the shoulder. *J Bone Joint Surg Am* 38:957–977
13. Hovelius BL, Sweden G (1987) Anterior dislocation of the shoulder in teen-agers and young adults. *J Bone Joint Surg Am* 69:393–399
14. Hovelius L (1999) The natural history of primary anterior dislocation of the shoulder in the young. *J Orthop Sci* 4:307–317