

Isolated Coronal Shear Fracture of the Nonossified Humeral Trochlea in a 7-Year-Old Patient

Michiyo Tomaru, MD,*† Denju Osada, MD, PhD,* Kazuya Tamai, MD, PhD,† Hiroshi Taneichi, MD, PhD†

Coronal shear fractures of the nonossified humeral trochlea are extremely rare in skeletally immature children. This fracture is difficult to diagnose accurately on routine radiographs. In addition, the mechanism of injury and appropriate treatment methods are unknown. We present the case of a 7-year-old boy who sustained an isolated coronal shear fracture of the nonossified humeral trochlea. Internal fixation of the fracture was performed with 2 K-wires. Two and a half years after surgery, the patient had pain-free active range of motion of the elbow from 0° to 130° with full forearm rotation and magnetic resonance imaging showed healing of the chondral fragment of the trochlea. Hand surgeons should be aware of the possibility of this rare fracture in skeletally immature children. Magnetic resonance imaging and arthrography are helpful in establishing the correct diagnosis. (*J Hand Surg Am.* 2017; ■(■):1.e1-e5. Copyright © 2017 by the American Society for Surgery of the Hand. All rights reserved.)

Key words Child, chondral fracture, coronal shear fracture, humerus, trochlea.



IN ADULTS, CORONAL SHEAR FRACTURES OF THE distal humerus usually involve the capitellum and a portion of the trochlea. Isolated fractures of the trochlea rarely occur because it has no muscular or ligamentous attachments and, unlike the radio-capitellar joint, the ulnohumeral joint is not subject to shear forces.¹ Because of its deep location within the elbow joint, the trochlea is usually inaccessible to direct trauma. An isolated fracture of the trochlea is rare in adults²⁻⁴ and usually associated with elbow

dislocation, ligamentous injury, or fracture of the capitellum, radial head, or olecranon.¹

Similarly, coronal shear fractures of the distal humerus are uncommon in the pediatric population, and their exact prevalence is unknown.⁵ There have been very few reports of osteochondral fractures of the capitellum in skeletally immature children.^{6,7} Furthermore, osteochondral fractures involving only the articular portion of the trochlea are extremely rare in skeletally immature children: to the best of our knowledge, only one such fracture has been reported in the English language literature.⁸ Grant and Miller⁸ described a 13-year-old boy who had a fracture-dislocation of the elbow with an osteochondral fracture of the trochlea that could not be detected with preoperative radiography.

We present the case of a 7-year-old boy who sustained an isolated coronal shear fracture of the non-ossified humeral trochlea and discuss the mechanism of injury. The patient and his parents consented to this case report being submitted for publication. The study was approved by our Institutional Review Board.

From the *Department of Orthopaedic Surgery, Dokkyo Medical University Nikko Medical Center, Nikko; and the †Department of Orthopaedic Surgery, Dokkyo Medical University School of Medicine, Mibu, Tochigi, Japan.

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Corresponding author: Denju Osada, MD, PhD, Department of Orthopaedic Surgery, Dokkyo Medical University Nikko Medical Center, 632 Takatoku, Nikko, Tochigi, 321-2593, Japan; e-mail: osada@dokkyomed.ac.jp.

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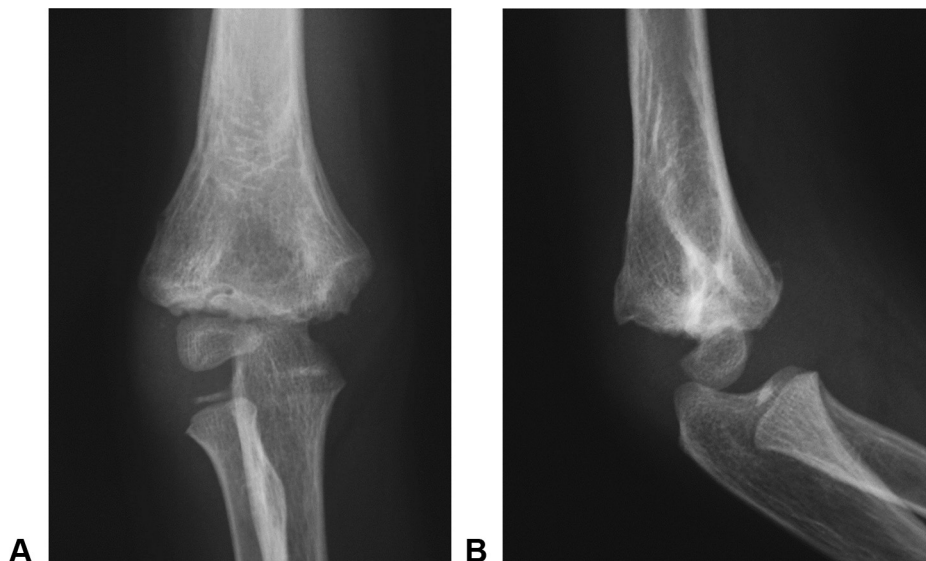


FIGURE 1: **A** Initial anteroposterior and **B** lateral radiographs of the right elbow showed a deformity of the distal humerus after a prior epiphyseal fracture-separation, but no new fracture lines.

CASE REPORT

A 7-year-old right-handed boy fell onto his outstretched right hand with the elbow in extension while playing soccer. Immediately after the accident, he had pain in the anterior aspect and difficulty flexing the right elbow. Five months before this accident, he had an epiphyseal fracture-separation of the ipsilateral distal humerus that was treated at our institution with open reduction and internal fixation with K-wires through a posterior approach. Two days before the current accident, the active range of motion of his right elbow was 0° to 130°, compared with 10° of hyperextension to 140° of flexion on the contralateral side. The carrying angle of both elbows was 180°.

Physical examination revealed moderate swelling and tenderness over the anterior aspect of the elbow. The active and passive ranges of motion were 10° to 80°. There were no neurologic or vascular deficits. Anteroposterior and lateral radiographs showed a deformity of the distal humerus because of the previous epiphyseal fracture-separation, but no new fracture lines (Fig. 1). Magnetic resonance imaging (MRI) performed to evaluate soft tissue incarceration showed a displaced coronal shear chondral fracture of the trochlea (Fig. 2). Before surgery, arthrography performed under general anesthesia revealed that a coronal shear fragment of the trochlea was responsible for the limitation in elbow flexion (Fig. 3).

Through an anterior approach to the elbow, a 17 × 13 × 7 mm chondral fragment was found (Fig. 4). Internal fixation of the fracture was performed using

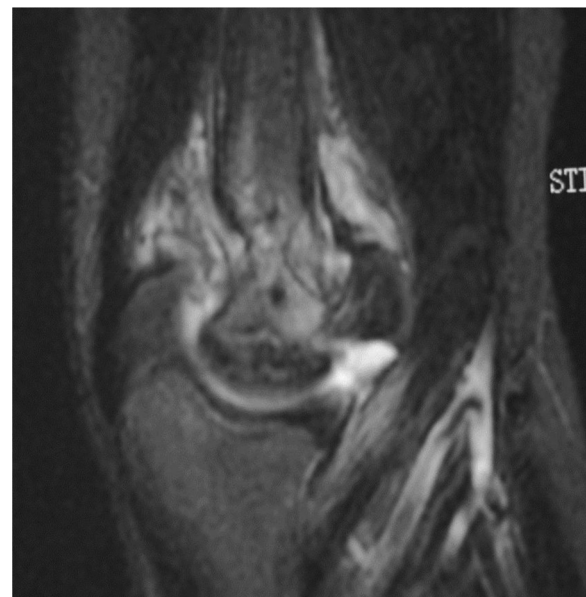


FIGURE 2: Sagittal short tau inversion (STI) recovery MRI showed a displaced coronal chondral fragment of the trochlea.

2 K-wires, with the tips pulled back below the articular surface of the fragment (Fig. 5). The patient's arm was immobilized in an orthosis for 4 weeks. The K-wires were removed 8 weeks after surgery.

Two and a half years after surgery, the patient had pain-free active range of motion of the elbow from 0° to 130° with full forearm pronation and supination. The anatomic carrying angle of the elbow was preserved. MRI showed healing of the chondral fragment of the trochlea and no signs of necrosis (Fig. 6).

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