Capitellar Fracture in a Child: The Value of an Oblique Radiograph. A Case Report

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Capitellar Fracture in a Child: The Value of an Oblique Radiograph

A Case Report

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Fractures through the capitellum are rare injuries, particularly in children[1-6], and, to our knowledge, such an injury has not been reported in a young child. A lateral condylar physeal fracture with possible displacement of the capitellum is much more common in this population[7-9]. It is important to recognize a fracture of the body of the capitellum because, if such a fracture is undiagnosed and untreated, it may go on to cause substantial disability by limiting elbow motion[1-6].

To our knowledge, the youngest reported patient with a fracture through an unfused capitellum was eight years and eleven months old[2]. The most recent and largest study, consisting of seven patients, was reported by Letts et al. in 1997[6]. The patients in that report were a mean of 14.7 years old, with the youngest patient being 11.6 years old.

We describe the case of a six-year-old patient with a capitellar fracture who was followed for two years. The fracture plane was markedly oblique in the body of the capitellum and was not visible on either anteroposterior or lateral radiographs. It was, however, visible on an oblique radiograph, illustrating the importance of the oblique radiograph in detecting this fracture pattern. The parents were informed that data concerning this case would be submitted for publication.

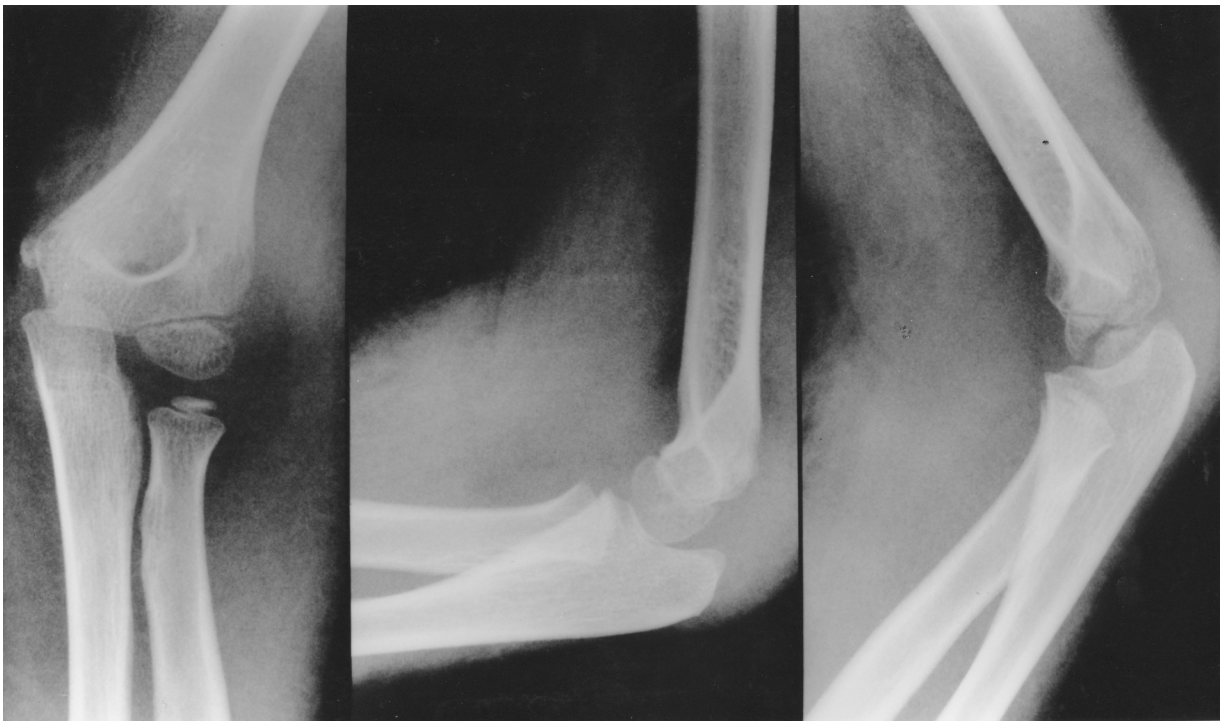

Fig. 1

Anteroposterior (left) and lateral (center) radiographs of the left elbow did not demonstrate the displaced lateral condylar fracture. However, an oblique radiograph (right) that was made unintentionally demonstrated a displaced lateral condylar fracture, with a largely coronal oblique fracture plane.

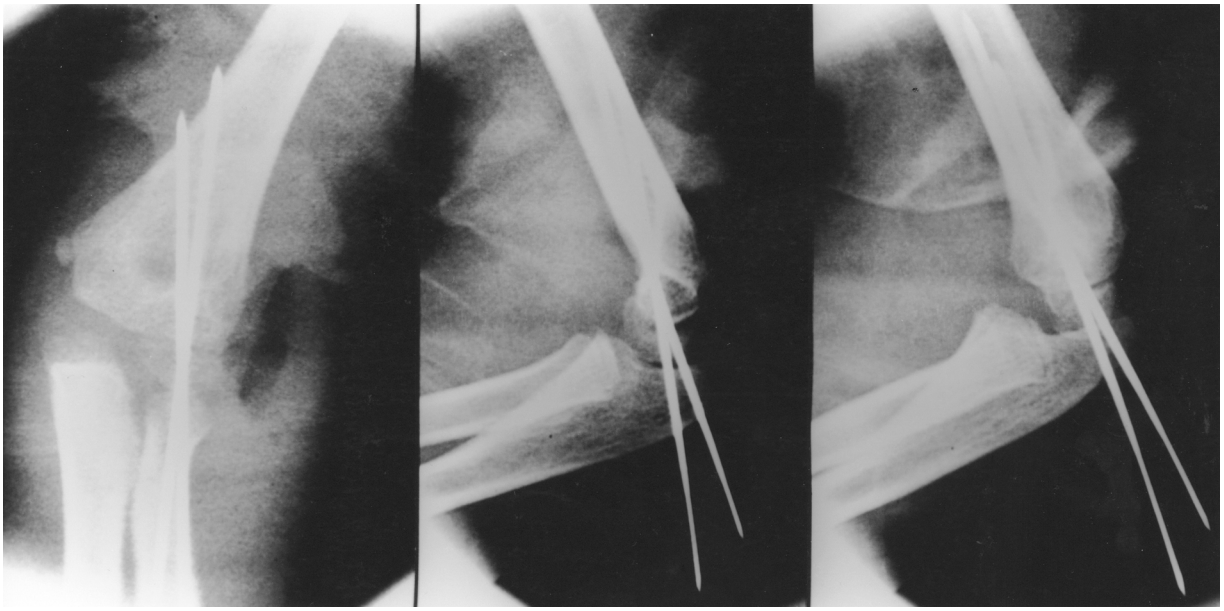

Fig. 2

Anteroposterior (left), lateral (center), and oblique (right) radiographs of the elbow, made after open reduction and Kirschner-wire fixation.

Case Report

A six-year-old girl presented with pain in the left elbow following a fall on the outstretched hand that occurred while she was playing on monkey bars at school. She was unable to move her elbow actively secondary to pain. Physical examination revealed mild swelling and tenderness over the lateral aspect of the distal part of the humerus. The patient was able to supinate and pronate to 90° without difficulty, but active flexion and extension were markedly limited by pain. Distally, the limb was intact.

Anteroposterior and lateral radiographs of the distal part of the left humerus did not reveal a definite fracture (Fig. 1, left and center). However, lateral soft-tissue swelling and both anterior and posterior fat pad signs were visible. Another radiograph (Fig. 1, right), made at the time of presentation but rejected as being technically inadequate, also was available. This radiograph, an unconventional oblique view of the elbow, revealed a 2-mm displaced fracture that passed through the body of the capitellum and extended obliquely in the coronal plane. The posterior fragment had rotated posterolaterally and was not readily discernible on the anteroposterior and lateral radiographic projections.

The capitellar fracture was treated with open reduction and percutaneous pinning with Kirschner wires through a lateral approach (Fig. 2). The unusual fracture pattern was confirmed visually. The extremity was immobilized in approximately 90° of flexion in a long-arm posterior splint spanning the elbow joint.

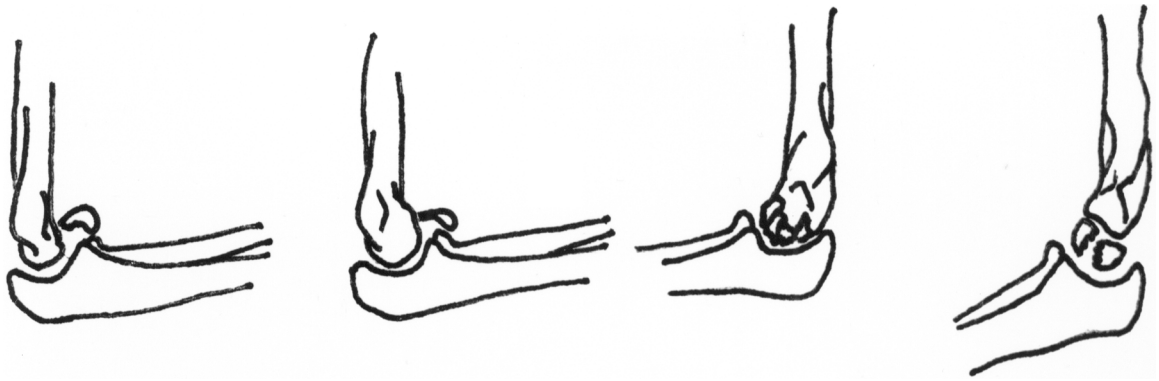

Fig. 3

Schematic lateral views of capitellar fractures. The first three illustrations (from left to right) depict type-I, II, and III fractures in adolescents as described previously[6]. The fourth schematic illustrates the type of fracture described in the present report. Note that the capitellum is unfused, the fracture passes through the capitellum, and the posterior fragment is displaced.

At the time of follow-up after three weeks of immobilization, there was evidence of fracture-healing with no evidence of redisplacement of the fracture fragment. The pins were removed, and range-of-motion exercises were started. At six weeks postoperatively, the patient was asymptomatic and the range of motion of the elbow was almost full and symmetrical compared with that on the right side. Two years following the injury, the elbow-carrying angle and range of motion were similar to those on the normal side. Repeat radiographs were not made at the time of the final follow-up.

Discussion

Capitellar fractures usually occur in older children and adolescents as the capitellum grows and ossifies and becomes more susceptible to shear injury. However, only a few cases have been reported[1-6].

The presently accepted classification of capitellar fractures in adolescents and adults is based on the original reports by Hahn in 1853[10] and Kocher in 1896[11]. A type-I (Hahn-Sternthal) fracture is one in which the entire articular eminence of the capitellum is separated anteriorly and superiorly from the trochlea. A type-II (Kocher-Lorenz) fracture is an osteochondral fracture involving only the articular cartilage of the capitellum with underlying subchondral bone. A type-III fracture, proposed by Grantham et al. in 1981[4], is a comminuted capitellar fracture. A type of fracture unique to children, the so-called sleeve fracture, was described by Agins and Marcus in 1984[1], and a variation was described by Drvaric and Rooks in 1990[2]. The fracture described in the present report (a fracture through the body of an unfused capitellum in a six-year-old patient) does not fit into the available classification systems. In contrast with the findings associated with most other fractures, the anterior aspect of the capitellum in our patient remained intact while the fracture fragment rotated posterolaterally (Fig. 3).

The radiographic diagnosis of a capitellar fracture may be difficult before the age of nine to ten years because the capitellum is not fully ossified and fused[2,12]. If the fracture fragment is minimally displaced, the fracture line may not be apparent until seven to ten days after the injury. The most frequently reported mechanism of injury to the capitellum is a fall onto an outstretched hand, with the radius imparting a shearing force onto the capitellum. As the capitellum is situated in the anterior portion of the lateral condyle, the fracture fragment is usually displaced anteriorly and superiorly. Milch[13] stated that if the fall is onto a flexed elbow, the capitellar fragment might be driven posteriorly. Gejrot remarked that there are as many theories regarding mechanisms as there are authors[14]. Because of the displacement patterns described at the time, Fowles and Kassab[3] made the statement that a capitellar fracture in a child can only be diagnosed on the basis of a properly positioned lateral radiograph. In fact, they warned that if the radiograph were even slightly oblique, the fragment would be hidden by the rotation of the humerus and the diagnosis would be missed. In our patient, however, the fracture was best visualized on the oblique radiograph. Other authors also have advised that oblique radiographs may be helpful for the identification of small fracture fragments or other unusual capitellar fractures in adolescents[15,16].

When the diagnosis is strongly suspected but cannot be confirmed radiographically, an arthrogram may be helpful, especially in the case of younger children. Yates and Sullivan[17] reported on their experience with the use of arthrography for the evaluation of elbow injuries in patients ranging from six to eight years of age and noted that the initial diagnosis was incorrect in seven of thirty-six patients. Varus stress radiographs made with the patient under appropriate anesthesia may be required to assess fracture stability. Computed tomography and magnetic resonance imaging can be more reliably diagnostic but would add substantial cost given the prevalence of elbow injuries in children. Equally important is the recognition of normal variants such as the lateral epicondyle epiphysis appearing as a distinct ossification center[17]. Contralateral elbow radiographs will help in these circumstances.

The treatment of capitellar fractures in children should be individualized on the basis of the type of fracture, the degree of comminution, the presence of associated elbow injuries, and the time-interval from injury[6]. Nondisplaced fractures can be treated with immobilization with uniformly good results[18]. Most displaced type-II osteochondral fractures of the capitellum are treated with excision of the fragment, which has been shown to be simple and has been found to allow early return of function in both children and adults[4,18]. Displaced type-I fractures, sleeve fractures, and fractures such as the one described in the present report should be reduced anatomically to restore articular congruity and to diminish the possibility of physeal arrest and later angular deformity[6]. This goal is best achieved by open reduction and percutaneous pinning with Kirschner wires. ■

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