

The coexistence of fractures of the capitellum and the radial head: a rare case

Kapitellum ve radius başı kırığının birlikte görüldüğü nadir bir olgu

Selcuk KESER, Nurettin DEMIREL, Ahmet BAYAR, Ahmet EGE

Department of Orthopaedics and Traumatology, Karaelmas University Medical School

Dirsek ekleminde kapitellum ve radius başı kırıklarının beraber bulunması nadir bir durumdur. Otuz altı yaşında bir erkek hasta, düşme sonrasında sağ dirseğinde şişlik, ağrı ve hareket kısıtlılığı yakınmalarıyla başvurdu. Düz radyografi, bilgisayarlı tomografi ve üçboyutlu rekonstrüksiyon incelemelerinde kapitellum ve radius başında ayrılmış, parçalı kırıklar görüldü. Bu kırıklara lateralden açık redüksiyon, kapitellum ve radius başındaki osteokondral parçalara Herbert vidaları ile tespit yapıldı. Hastanın üç yıllık takibinde klinik ve radyografik olarak başarılı sonuç alındığı görüldü.

Anahtar sözcükler: Dirsek eklemi/yaralanma; kırık tespiti, internal; kırık, parçalı/cerrahi; radius kırığı/cerrahi.

The coexistence of fractures of the capitellum and the radial head in the elbow joint is a rare entity. A 36-year-old man presented with complaints of pain, swelling, and limited range of motion in the right elbow after a fall. Radiography, computed tomography, and three-dimensional reconstruction of computed tomography images revealed displaced and comminuted fractures in the capitellum and the radial head. The fractures were treated with open reduction via a lateral approach and osteochondral fragments were fixed with Herbert screws. Clinical and radiographic results were excellent at the end of a three-year follow-up.

Key words: Elbow joint/injuries; fracture fixation, internal; fractures, comminuted/surgery; radius fractures/surgery.

Isolated fractures of capitellum humeri and radial head are frequently encountered among fractures of the elbow and treatment methods are still under debate.^[1] Coexistence of these fractures are seldom and knowledge about treatment is not sufficient. There are only a few case reports about this entity.^[2,3]

Case report

Thirtysix years old recreational athlete attended to our hospital with the complaints of pain, swelling and restriction of motion of the elbow joint following a fall during a football game. Physical examination revealed generalized swelling of the elbow region and tenderness at radial head and lateral condyle. Motion of the elbow was restricted and painful. While there was tenderness at medial collateral ligament, valgus stress test was negative.

Neurovascular examination of the right upper extremity was normal. Anteroposterior (AP) radiograph revealed a fracture of radial head. Since severe pain of the elbow did not let us to obtain precise AP and lateral radiographs, computerized tomography (CT) was utilized. Computerized scans revealed a displaced fracture of capitellum, together with a displaced two part fracture of radial head (Figure 1). Three-dimension reconstruction of the CT scans better showed that capitellar fragment was displaced forward and upward, while radial head fragments were displaced downward (Figure 2).

The patient was operated 36 hours after the trauma. Fractures were exposed through a lateral (Kocher) incision. Capitellar fragment which included the joint surface was of 1.5x1 cm dimensions. Anterolateral part of the fragment was seen to con-

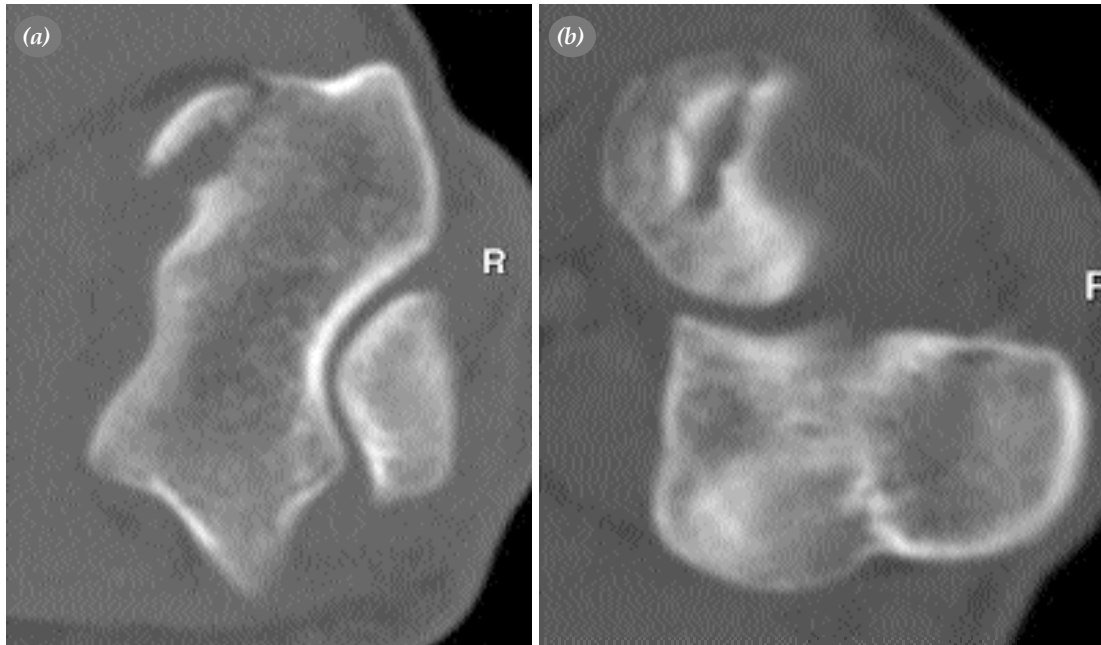


Figure 1. Computerized tomography scans of the capitellum (a) and radial head (b) before operation

tain more subchondral bone. Osteochondral fragment was reduced and a provisional fixation was obtained with a 1mm Kirschner wire. Afterwards, the fragment was fixed with a Herbert screw put in anteroposterior direction through the part with more subchondral bone. The proximal threaded portion of the screw was countersunk into the subchondral bone. Since the amount of subchondral bone was insufficient and there was risk of fracturing the thin cartilaginous portion of the capitellar fragment, no other screw was placed. Two free 2mm osteochondral fragments were also removed. Two fragments of radial head fracture were also reduced and fixed with Herbert screws (one for each) from the joint surfaces as in the capitellum and again were countersunk into the cartilage (Figure 3).

Cast immobilization was used for 3 weeks after the operation. Active range of motion exercises were started at first postoperative week with great caution. At sixth postoperative week, flexion was 140° with a flexion contracture of 10°; pronation and supination were 80° and 75° respectively. Active-assistive exercises were then added. Strengthening exercises were started after 3 months. At the latest follow up at 3 years, the patient had full range of motion of the elbow, there was no instability and he was pleased about the treatment (Figure 4). Radiologic examination also revealed normal anatomy without any signs of degenerative changes (Figure 5).

Discussion

Capitellum and radial head fractures occur with falls on palms. These fractures occur due to striking of radial head into the anterior part of lateral condyle. Lateral elbow radiograph is important for the diagnosis, but conventional methods might not be enough.^[1,2,4,5]

There are three types of capitellum fractures: Type 1 (Hahn-Steinthal fracture) contains a great portion of capitellum with the fracture line going



Figure 2. Three-dimensional reconstruction of the CT scans. White arrow head: displaced capitellum fracture; white arrow: displaced radial head fracture



Figure 3. Anteroposterior (a) and lateral (b) radiographs of the elbow in plaster at 2nd week after operation

down to lateral part of trochlea. Type 2 (Kocher-Lorenz fracture) Consists of anterior cartilaginous portion of capitellum with some subchondral bone. Type 3 (Broberg-Morrey fracture) is the comminuted fracture of capitellum.^[6] Anteroposterior elbow radiographs may fail to show especially type 2 fractures. Although closed reduction and cast immobilization may be performed for the treatment, open reduction and internal fixation is more commonly suggested. In type 2 and 3 fractures,

those fragments that cannot be fixed, should be removed.^[1,4]

Radial head fractures have 4 types according to Mason classification: Type 1 is a nondisplaced marginal fracture, type 2 is a displaced marginal fracture, type 3 is a comminuted fracture and type 4 is a fracture with dislocation of the elbow.^[1] The involvement of the articular surface is important for the method of treatment. Although successful

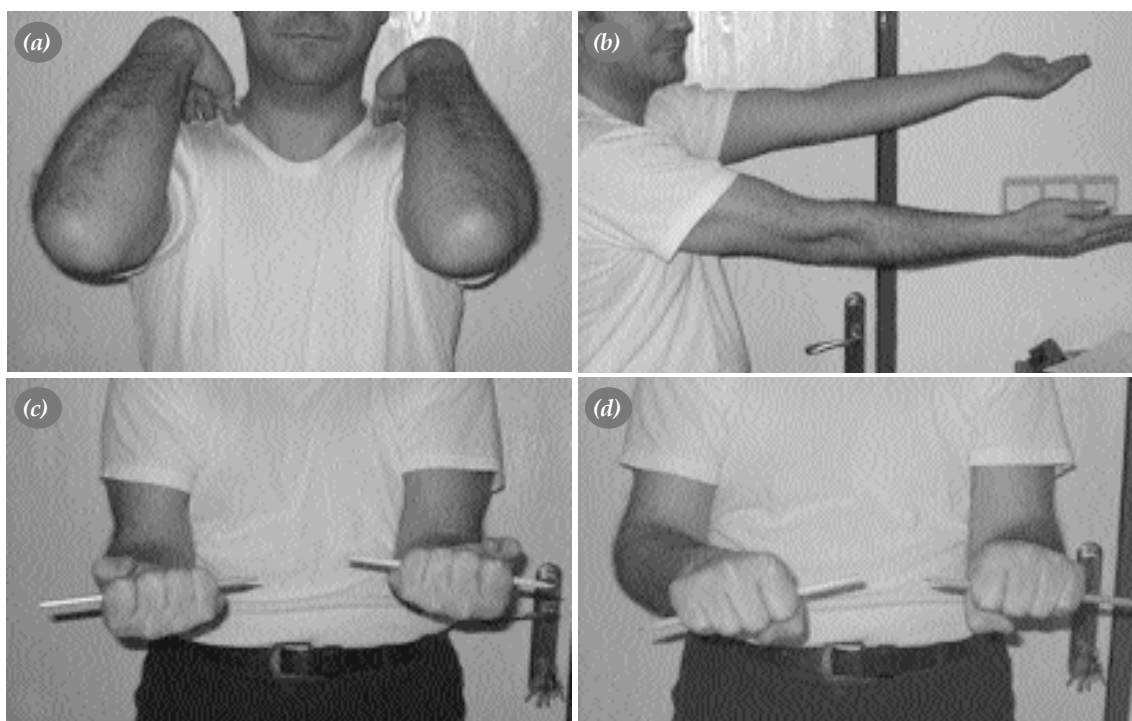


Figure 4. (a-d) Elbow movements were painless and full at 3rd year after operation

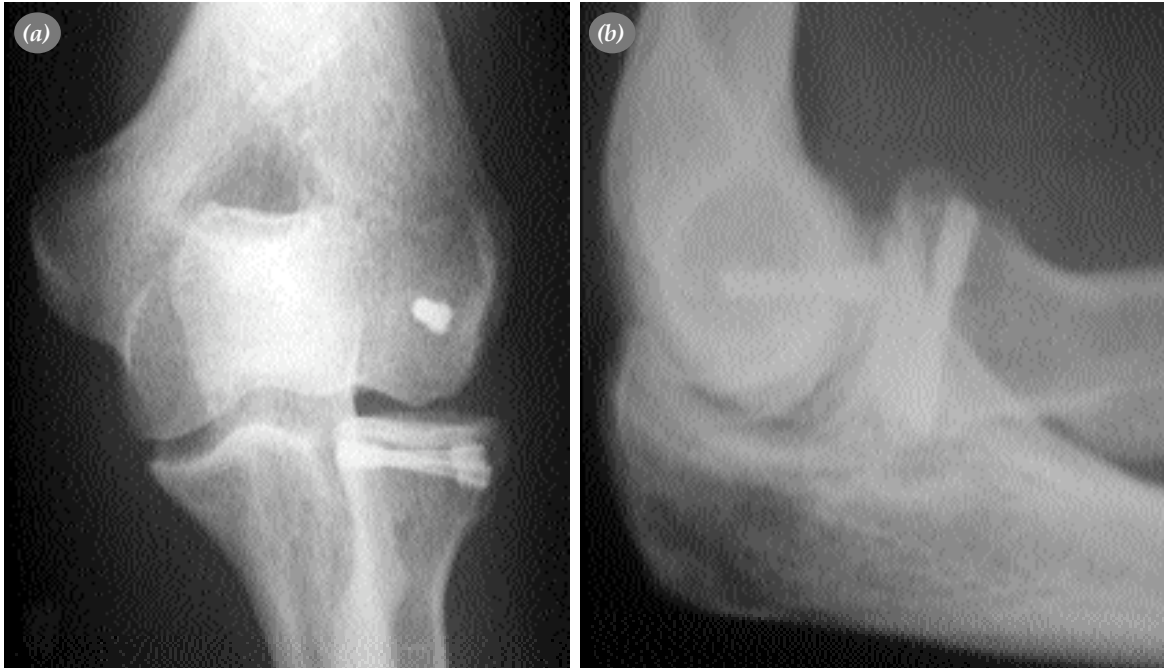


Figure 5. Anteroposterior (a) and lateral (b) radiographs of right elbow 3 years after operation

results can be achieved by conservative measures in general, osteosynthesis is performed for the fractures which are close to the proximal radioulnar joint and the fractures with more than 2 mm of displacement involving more than 1/3 of the articular surface. Radial head prosthesis or radial head excision are recommended for the highly comminuted fractures.^[1,5]

Capitellum fracture associated with radial head fracture is a very rare entity in the literature. Ward and Nunley^[2] achieved good results in four of the seven such patients with surgical treatment. They reported that; successful results can be achieved by immediate open reduction with internal fixation of the large fragments of capitellum and radial head; excision of the small fragments and immediate postoperative mobilization.

Soejima et al^[3]; have reported a case of medial capsule avulsion together with both fractures. They performed internal fixation for the three fragmented radial head fracture by Herbert screws and excision of the two fragmented capitellum fracture. Although the patient had no complaint, they observed limitation of the elbow joint motion in extension and rotations at the end of the 13 month follow up.

Öztürk et al^[7], have reported excellent result at the 44 month follow up of a 38 year old case for

whom internal fixation with a 3.5 mm screw was performed for type 2 radial head and capitellum fractures in their series of 15 cases with internal fixation of radial head fractures.

Our patient had type 2 capitellum and type 2 radial head fractures. At the 3.rd year follow up after surgery, the patient satisfaction was perfect, joint range of motion was full and the joint was stable. There was no sign of avascular necrosis, heterotopic ossification and arthrosis in the A-P and lateral radiographs. We attributed our successful result to the suitable size of the capitellar osteochondral fragment and two fragments of the radial head for fixation and to the use of Herbert screws.

Herbert screw fixation allows immediate motion after surgery of intra-articular fractures by providing a strong interfragmentary compression. The subchondral positioning of the screw causes less articular chondral injury when compared to the screws with head offsets. Also the removal of the screw is not essential after the fracture union.^[4] In our case the placement of the screws were performed through the articular surfaces of the capitellum and radial head. In spite of forming holes on the chondral surface, this method provides practical fixation of the bone fragments, fixation through the area with largest subchondral bone mass and embedding the screw cautiously into the articular surface.

Detailed radiological examination is necessary for surgical planning before the operation of the rare cases of coexistent capitellum and radial head fractures. There can be obstacles during reduction and fixation of these fractures. The aim of the surgical treatment has to be anatomic reduction and stable fixation that would allow early mobilization. We think that; good results can be achieved by excision of the irreparable small intra-articular fragments and fixation of the large fragments by Herbert screws.

References

1. Crenshaw AH. Fractures of shoulder girdle, arm, and forearm. In: Canale ST, editor. *Campbell's operative orthopaedics*, Vol. 3, 9th ed. Missouri: Mosby Year Book; 1998. p. 2262-320.
2. Ward WG, Nunley JA. Concomitant fractures of the capitellum and radial head. *J Orthop Trauma* 1988;2:110-6.
3. Soejima T, Ando N, Ishida H, Yoshida K, Nagata K. Combined fractures in the capitellum and the radial head associated with medial capsular avulsion. *Kurume Med J* 2002;49:57-9.
4. Sano S, Rokkaku T, Saito S, Tokunaga S, Abe Y, Moriya H. Herbert screw fixation of capitellar fractures. *J Shoulder Elbow Surg* 2005;14:307-11.
5. Ring D, Quintero J, Jupiter JB. Open reduction and internal fixation of fractures of the radial head. *J Bone Joint Surg [Am]* 2002;84-A:1811-5.
6. McKee MD, Jupiter JB, Bamberger HB. Coronal shear fractures of the distal end of the humerus. *J Bone Joint Surg [Am]* 1996;78:49-54.
7. Ozturk K, Esenyel CZ, Orhun E, Ortak O, Durmaz H. The results of open reduction and internal fixation of radial head fractures. [Article in Turkish] *Acta Orthop Traumatol Turc* 2004;38:42-9.