CASE REPORT

Internal fixation for coronal shear fracture of the capitellum with polylactide resorbable fixation

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A 24-year-old woman with pain in the right elbow after a fall demonstrated a coronal shear fracture on radiographic studies. Perioperative a coronal shear fracture was seen and treated successfully with a polylactide Rigid fix resorbable pin. The operative correction resulted in normal function at 6 months follow-up. We state that a capitellum shear fracture can be fixated with a single resorbable pin, leading to successful fusion.

fracture, described by Grantham *et al*,⁹ is a comminuted capitellar fracture.

McKee and Jupiter¹⁰ described a fourth type, a shear fracture of the distal part of the humerus in the coronal plane including the capitellum and most of the trochlea.

Treatment has included closed reduction,^{4 8} excision,^{11 12} open reduction with or without internal fixation^{1 5 10} and prosthetic replacement.¹³

BACKGROUND

Instead of resection of a small shear fracture of the capitellum, even in a really small fragment, fixation with a resorbable pin can prevent instability in the future.

CASE PRESENTATION**Introduction**

Coronal fractures of the distal aspect of the humerus involve the capitellum, the trochlea or a combination of both.¹⁻⁴ Capitellum fractures are uncommon⁵ and in children often undiagnosed.⁶

An undiagnosed and untreated capitellar fracture can result in an impaired elbow motion⁷ and instability.⁸

Bryan and Morrey⁵ classified capitellar fractures as type I, II and III.

Type I fracture (Hahn-Sternthal) the entire articular eminence of the capitellum is separated anteriorly and superiorly from the trochlea. Type II fracture (Kocher-Lorenz) is an osteochondral fracture involving only articular cartilage of the capitellum with underlying subchondral bone. A type III

Case report

A 24-year-old woman was seen on the emergency room with pain in the left elbow a week after a fall on the outstretched hand. She complained about pain and an impaired function of her left elbow.

Physical examination revealed mild swelling and tenderness over the lateral aspect of the distal part of the left humerus. Movements were limited by pain: active flexion 100° and an extension lag of 30°. The distal arm and hand did not show neurovascular impairment.

INVESTIGATIONS

Lateral and anteroposterior radiographs of the left elbow revealed a displaced coronal shear fracture of the capitellum and an intra-articular radial head fracture. The lateral view showed a corpus liberum ventral in the elbow joint space (1 in figure 1). The anteroposterior view showed a defect in the articular surface of the distal humerus (2 in figure 1).

The capitellum was displaced anteriorly and superiorly. The fracture of the capitellum was classified as a type I fracture (Kocher-Lorenz) in the

Figure 1 Lateral and anteroposterior radiographs of right elbow did demonstrate a displaced coronal shear fracture of the capitellum and an intra-articular radiushead fracture. The lateral view shows a loose fragment ventral in the elbow (1). The anteroposterior view shows a defect in the articular surface (2).

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Figure 2 (A) Surgical exposure fossa cubiti with a loose fragment (2) and a defect at the surface of the capitellum. (B) Loose fragment of cartilage with a shell of subchondral bone.

Bryan and Moray classification, wherein we could choose between excision or fixation.

TREATMENT

The operation was performed through a lateral approach (figure 2). The fracture pattern was confirmed visually. The osteochondral fragment (2 in figure 2) was repositioned in the articular defect of the capitellum (1 in figure 2) and fixated with polylactide (PLA) Rigid fix resorbable pin (2.7 mm; figure 3). The radial head fracture was undisplaced and therefore treated conservatively.

Postoperatively the extremity was immobilised in 90° of flexion in a long-arm posterior splint spanning the elbow joint for 3 weeks (figure 2).

OUTCOME AND FOLLOW-UP

At 3 weeks of immobilisation, x-rays showed no evidence of redisplacement of the fracture fragment. Range-of-motion exercises were started.

At 6 weeks postoperatively, the patient was asymptomatic and the range of motion of the elbow was almost full. Flexion/extension was slightly impaired (120/0/0) compared with the contralateral side. The x-rays showed fracture healing with no evidence of redisplacement or malunion (figure 4).

Six months following the injury, the elbow-carrying angle and range of motion were symmetric and the patient was pain free. The x-rays show a complete consolidation of the fracture, a radiolucent area marking the PLA pin (figure 5). No evidence of malunion or non-union occurred.

Figure 3 Reposition of the cartilage and subchondral surface of the capitellum. (A) Polylactide resorbable pin is placed in a predrilled hole in the anteroposterior direction (1). (B) The pin is placed just under the cartilage surface.

DISCUSSION

Fractures of the capitellum are rare injuries. It is important to recognise a fracture of the body of the capitellum because, if untreated it can lead to a substantial disability with impaired elbow function.⁸ Resection of the capitellum results in a poor outcome. This is due to restriction of motion and instability.

We describe the case of a 24-year-old woman with a coronal shear fracture from the capitellum a week after a fall on the outstretched hand. The fracture was classified as a type I fracture. Because of the small subchondral bone mass, there was no ability to fixate the coronal shear fracture with metal wires or screws. We used one Rigid fix resorbable PLA pin to fixate the fragment to the capitellum. Six months of follow-up, the elbow-carrying angle and range of motion were symmetric and the patient was pain free. The x-rays show a complete consolidation of the fracture.

The existing technique of a type I shear fracture with a small underlying subchondral bone is resection. Only three cases of fixation with resorbable implants of a capitellar fracture are reported in the literature.

Bilic *et al*¹⁴ describe the fixation of a capitellum fracture with three resorbable implants to improve mechanical stability of the osteotomised capitellar fragment. In their study a type I fracture of the capitellum was fixated 3 months postinjury with a good result. Hirvensalo *et al*³ used two resorbable implants at a type I capitellar fracture. Peltö-Vasenius *et al*¹⁵ used two resorbable implants at 57 patients.

In our case the underlying subchondral bone was very thin. There was no ability to use metal screw or wires. The size of the fragment limited fixation with only one resorbable pin.

This case illustrates that the use of one resorbable implant in a type I capitellar fracture with a small part of underlying subchondral bone can be sufficient for a stable reposition and fixation. The resorbable pin and the physiological articular compression in the elbow by the joint reaction force prevent dislocation of the small fragment. The rotational stability of the fragment was established by the trabecular surface of the subchondral bone.

Learning points

- ▶ Instead of resection of a small type I shear fracture of the capitellum we advocate fixation with a resorbable pin to prevent instability in the future.
- ▶ Undiagnosed and untreated capitellar fracture can result in an impaired elbow motion.
- ▶ Resection of the capitellum results in a poor outcome.

Figure 4 Six weeks postoperative x-ray of the elbow in a splint with a normal articular surface. The radial head fracture is undisplaced. The radiolucent line (1) indicates the position of the polylactide pin.

Figure 5 Six months postoperative x-ray of the elbow with a normal articular surface. The radial head fracture is consolidated. The radiolucent line (1) indicates the position of the polylactide pin.

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