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Case report

Operative management of a shear fracture of the bilateral capitellum: A case report and review of the literature

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ABSTRACT

Fracture of bilateral capitulum humeri is a very rare injury. We present a case of a 38-year-old woman, affected by a shear fracture of bilateral capitellum after a motorcycle accident. Intervention was carried out through a lateral approach on both sides and direct fixation of the fragment with headless screws. Consolidation was achieved and no signs of avascular necrosis occurred at 24 months of follow-up. The patient returned to her previous activities with no functional limitations. To the best of our knowledge, only four cases are reported describing different types of treatment and postoperative period of cast immobilization. According to our review of the literature regarding capitellar fractures, we preferred an immediate postoperative rehabilitation of the elbow, following the stable osteosynthesis.

Introduction

Fractures of capitulum humeri in the coronal plane are rare injuries, accounting for nearly 1% among all elbow fractures.[1] These injuries usually occur after an axial loading force to the capitellum through the radial head. Bryan and Morrey[1] described three types of capitellar fractures. These fractures were further characterized with respect to the absence (A) or presence (B) of a posterior condylar comminution. X rays in the standard AP and lateral views should be performed including forearm and wrist radiographs for associated injuries; moreover, a CT scan is necessary for a detailed preoperative planning. These fractures often result in significantly high long-term morbidity if the surgical treatment is delayed. Open reduction and internal fixation (ORIF) is mandatory in order to obtain the best restoration of the articular surface and allow an early joint mobilization. The integrity of the lateral collateral ligament (LCL) must be assessed during the surgical exposure and the stability of the elbow joint must be tested during the intervention after proper fixation. An isolated, bilateral shear fracture of the capitulum humeri is an extremely rare event with only four case reports found in literature. Here, we present a case of a bilateral capitellar shear fracture treated with ORIF, reporting the surgical management as well as the clinical and the radiographic outcome.

Case report

A 38-year-old female fell onto both her outstretched hands after a motorcycle accident. Clinical examination at the emergency department in our hospital found diffuse swelling of both elbows, together with intense pain and impairment of any elbow joint motion. Radiographs in the AP and lateral planes showed a bilateral fracture of the capitellum humeri without evidence of elbow dislocation (Figs. 1a and 2a). Subsequent X-rays to the forearm and wrist did not reveal concomitant fractures or distal radio-ulnar (DRUJ) joints. The next day, a CT scan was performed with a 3D reconstruction (Figs. 1b and 2b) in the sagittal and coronal planes for a detailed preoperative evaluation. Both capitellar fractures were classified as type 1A. Type “1” refers to the Bryan and Morrey's classification, describing a shear fracture in the coronal plane involving most of the capitellum and none of the trochlea. “A” type, according to Dubberley et al, refers to the absence of posterior condylar comminution. At the third day after trauma, our patient underwent bilateral same-day surgery (ORIF), simultaneously for both capitellar fractures, by two surgical equips.

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Fig. 1. A: Preoperative X-rays of the right elbow in AP and lateral view. The capitular fracture is easily identified on the lateral projection. B: CT 3D scan reconstruction. C: Postoperative X-rays after headless screw osteosynthesis.

A lateral approach was performed bilaterally with the elbow already been flexed at 90°. Skin incision began 2 cm proximally to the tip of the lateral epicondyle and extended distally and for approximately 4 cm towards the Lister's tubercle. We used the superficial interval between the extensor digitorum communis and the extensor carpi radialis longus and brevis, as described by Kaplan. At the deep level, we proceeded by splitting the lateral annular ligament complex, remaining anterior to the LCL. No LCL avulsion and/or disruption were detected at any of the two sites. Particular attention was paid in order to preserve the LCL and the posterior interosseous nerve. At this point, there was no need to release the lateral ligamentous complex from the distal aspect of the humerus to achieve a better visualization of the fracture. An excellent exposure of the capitellar fractures was achieved showing no impact and/or fragmentation of the capitulum humeri.

Debridement of the free capitellar fragment was performed, removing any residual fibrous tissue and hematoma. The fragments were reduced in direct visualization, held with a dental pick and then temporally fixed with the guide wires of the mini Acutrac (Acumed, Hillsboro, OR, USA) headless screws. Definitive osteosynthesis from anterior to posterior, with one headless Acutrac mini compression screw was realized at both sites, achieving a stable and anatomical reconstruction of the articular surface with screws buried underneath the cartilage. During the procedure, the tip of a guide wire used for temporary fixation was previously broken and intentionally left into the distal right humerus, resulting in no interference with fracture's definitive osteosynthesis. Upon fixation, elbow joint was tested in varus/valgus stress under fluoroscopy and found to be stable in both sides.

Postoperative radiographic exam confirmed anatomic reduction of the capitellar fractures and the correct hardware positioning (Figs. 1c and 2c). The patient was held in flexion at 90° in a provisionary cast. Starting from the second postoperative day, a functional brace for the elbow was positioned with a free range of motion (ROM) between 100° and 20° of flexion. The hinged brace protected the elbow joint from any varus/valgus deviation stress. No load-bearing or strengthening exercises were allowed until early fracture healing was established, within approximately 2 months after surgery. Upon removal of the sutures at 14 days after surgery, the patient was also allowed to come out of the brace and perform gravity-aided and assisted flexion/extension-supination/pronation exercises of the elbow joint.

Clinical and radiographic evaluation was performed at 1, 2, 3, 6, 12 and 24 months after surgery. At each follow-up ROM in flexion/extension and supination/pronation was recorded. After 6 months and during the final follow-up, the American Shoulder and Elbow Surgeons (ASES) score was also obtained. At the first month flexion/extension range was found to be 100°–5° on the right and 95°–10° on the left. Supination/pronation was measured 120° on the right and 110° on the left elbow. After the second month, the fracture site was considered healed, based on radiographic appearance of the fracture and absence of pain on movement in both sides during clinical evaluation. ROM in flexion/extension was found to be 140°–0° on the right and 130°–0° in the left. Supination/pronation was measured at 180° on both sides. Three months after surgery, there was 145° of flexion with full extension on the right (0°–145°), and 135° of flexion and full extension on the left side (0°–135°) (Fig. 3). No variation was detected for ROM at the 6, 12 and 24 months follow-up and the ASES score resulted 100.