doi:10.17659/01.2019.0027

Journal of Case Reports 2019;9(2):106-109

Transcondylar Distal Humerus Fracture with Capitulum Fracture in a Pediatric Patient

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Received : December 13, 2018
Accepted : May 14, 2019
Published : May 20, 2019

Abstract

Background: Transcondylar humerus with capitulum fracture is a relatively rare elbow injury, particularly in pediatric age group. Most of them occur after a fall onto an outstretched hand with the elbow in varying degrees of flexion. Since the capitulum fragment does not have a soft-tissue attachment, it can displace and interfere with joint motion. *Case Report*: A 16 year old patient presented to us with failed fixation following Kirschner (K)-wire fixation and above elbow slab for transcondylar humerus with capitulum fracture. His K-wire was removed, fracture was anatomically reduced and fixed by cannulated cancellous screw and K-wire for transcondylar fracture and two Herbert screws for capitulum fracture. Post-operatively at final follow-up the patient had acceptable painless range of movement of elbow joint and returned to his daily activities without any difficulty. *Conclusion*: Successful management of such fractures depends on anatomical reduction of the fracture, reconstruction of the articular surface and appropriate rehabilitation.

Keywords: Arm Injuries, Bone Wires, Elbow Joint, Humeral Fractures, Humerus.

Introduction

Coronal shear fractures of distal humerus involving the capitulum are rare injuries with articular complexity [1], and are technically challenging for management. These fractures may involve metaphyseal comminution of both columns and associated intra-articular injuries are common. Hahn first described a fracture of the capitulum in 1853 [2]. The classifications most commonly used for capitulum fractures are the descriptive Bryan and Morrey classification (modified by McKee *et al*.) and the Dubberley classification [3-6].

Capitulum fractures with associated transcondylar humerus fracture in pediatric age group is a rare finding and posses a significant challenge while treating because of complexity of fracture and difficulty in reduction. Fair to poor results are noted in articular comminution with associated articular injuries. Various implants including headless (Herbert) compression screws, mini-fragment screws, Kirschner (K)-wires, bio-absorbable implants and columnar plating are advocated for reconstruction of these complex fractures. Inspite of articular fragments being free of soft tissue attachments, osteonecrosis and osteoarthritis reported rate is less after internal fixation. We present a case of transcondylar humerus fracture with capitulum fracture in 16 year old young male patient which was operated one month back outside our hospital with closed reduction and K-wire fixation.

Case Report

A 16 year old patient presented to us after one month following K wire fixation and above elbow slab for transcondylar humerus with capitulum fracture **[Fig.1]**. On examination, there was tenderness at both the condyles of humerus. There was no swelling or any features of inflammation

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or infection. Deformity and range of motion of elbow could not be assessed due to K-wires in situ. Anterior-posterior and lateral radiograph of elbow showed transcondylar humerus with capitulum fracture with improper reduction and K-wire fixation for lateral condyle. CT scan showed ununiting fracture and improper reduction.

After taking written and informed consent, the patient was submitted for surgery. In supine position under general anaesthesia, the fracture was approached by two separate approaches; anterolateral (Kocher's) approach for capitulum fracture and medial approach for transcondylar fracture. The transconylar part was fixed first with one K wire and one 4 mm cannulated screw medially and two K wires laterally, after which the capitulum fracture was reduced and fixed with two Herberts screws. Closure was done in layers and above elbow posterior slab was given immediate post-operatively. After removing sutures at post-operative day 12, above elbow cast was given for total six weeks post-operative.

At six weeks, K wire was removed and patient was mobilized with active elbow range of movements. By 12 weeks post-operative patient achieved at 110 arc of movement (25 degree to 135 degree) at elbow joint with full pronation and supination. At final follow up (6 months) patient resumed all his pre-injury activities without any difficulty.

Discussion

Transcondylar distal humerus along with capitulum injury is rare and complex in nature. These injuries result from axial loading of the capitello-trochlear area by the forces transmitted through the radial head and could be associated with more complex distal humeral fractures and dislocation with concomitant ligamentous injuries. The complexity of these fractures in recent times has been better appreciated by digital imaging. Radiological diagnosis is difficult in pediatric patients because

Fig.1: *Pre-operative image showing trnscondylar human fracture.*

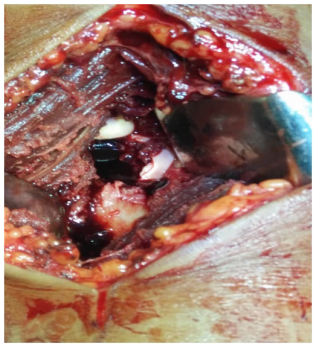

Fig.2a, 2b: *Anterolateral approach to elbow.*

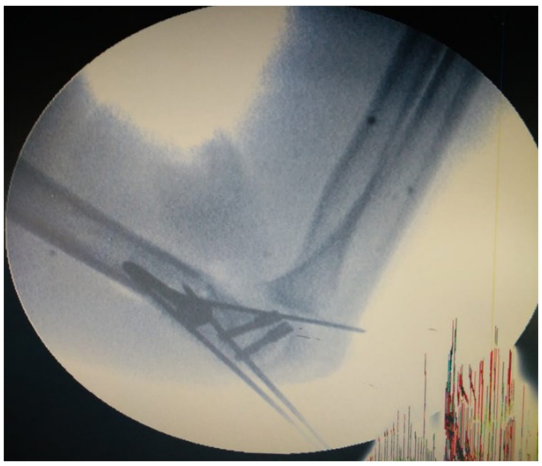

Fig.2c: *Intra-operative IITV image showing fracture reduction and fixation with K wire and screws.*

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the capitulum is not fully ossified and gets fused before the age of 9-10 years. Characteristic finding is the "double-arc sign" seen on lateral X-ray due to the sub-chondral bone of the capitulum and lateral part of trochlea. Some authors have suggested an oblique view as well as contralateral limb comparative view to detect this injury. In case of any doubts, CT is advocated.

Open reduction and internal fixation provides anatomical reduction, stability and early mobilization and has become the preferred treatment. Closed reduction, immobilization and fragment excision are known to be associated with poor outcomes. Excision of the fragment can progress to instability of the elbow. Excision to avoid avascular necrosis is suggested by some but can lead to radio-humeral osteoarthritis and instability of the elbow. Operative treatment of capitulum fractures has also been shown to confer favorable clinical outcomes compared with non-operative treatment and is therefore generally recommended in most cases [7-17]. Failure of fixation or non-anatomic reduction leads to articular incongruity, post-traumatic arthrosis, stiffness and potential ulno-humeral instability.

The intra-articular and complex nature of these fractures makes optimal surgical exposure and implants debatable. Various internal fixation methods for capitulum have been described, including K wires, cancellous screws, Herbert screws and absorbable pins. There are also reports of plate fixation of the fracture. Kirschner wires do not provide enough stability for mobilization before fracture healing and also damage the articular cartilage. Headless screw fixation is preferred modality as damage to articular cartilage in minimal and fixation is more rigid as compared to K wire.

According to DASH criteria we have achieved excellent result. At the final follow up of 6 months patient had achieved acceptable elbow range of motion and there is no difficulty in daily routine.

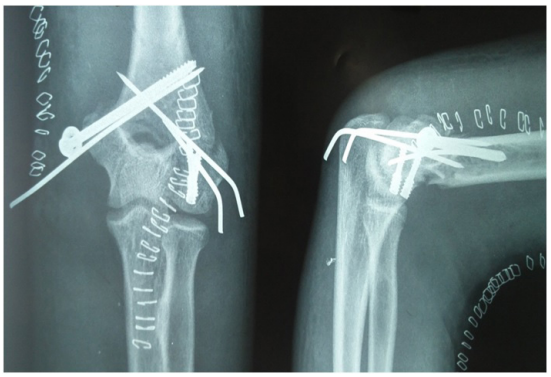

Fig.3: *Immediate post-operative radiograph.*

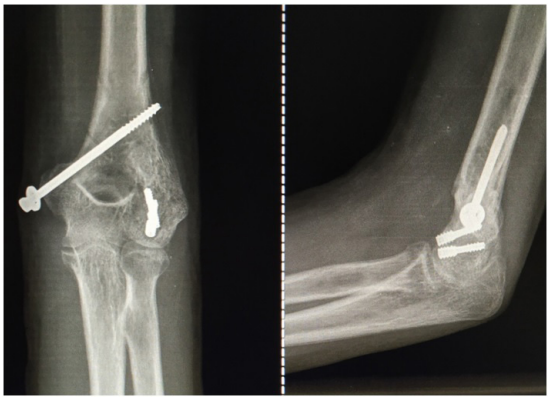

Fig.4: *12 weeks post-operative radiograph showing fracture union.*

Conclusion

The successful management of transcondylar distal humerus with capitulum fracture depends on anatomical reduction of the fracture, reconstruction of the articular surface, and appropriate rehabilitation.

Contributors: RJS: manuscript writing, patient management; JVT: manuscript editing; PNR, KYS, PG: manuscript editing, patient management. RJS will act as guarantor. All authors approved the final version of this manuscript.
Funding: None; *Competing interests*: None stated.

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