



# A Type IV Capitellum Fracture in a Child: A Case Report

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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**Case Report**

## **ABSTRACT**

**Background:** Isolated capitellum fractures are relatively rare and frequently go unnoticed, creating diagnostic challenges due to the lack of visible deformity in the elbow and subtle radiological signs. These fractures are best identified on lateral radiographs, where they exhibit a characteristic "double arc" sign. The use of various surgical techniques has significantly improved outcomes for these injuries.

**Case Presentation:** A 13-year-old girl presented with a left elbow injury resulting from a domestic accident. Radiographic assessment indicated a capitellum fracture, which was confirmed through a CT scan. Surgical treatment was undertaken, resulting in a complete recovery and full range of motion in the elbow.

This case underscores the vital importance of prompt diagnosis and surgical intervention for capitellum fractures in pediatric patients, demonstrating that appropriate treatment can lead to excellent recovery results.

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**Keywords:** Capitellum fracture; articular; reduction; treatment.

## 1. INTRODUCTION

“Capitellum fractures are rare elbow injuries, constituting 6 % of distal humeral fractures and 1 % of elbow fractures” [1].

Furthermore, capitellum fractures are often accompanied by other fractures such as radial head and lateral epicondyle fractures [2,3].

We describe a case of a displaced anterior shear of the capitellum in a 13 years old child type IV described by McKee and type Ib described by Murthy with full recovery after surgical treatment.

## 2. CASE REPORT

A 13-year-old girl presented with a left elbow injury sustained from a fall onto an outstretched hand during a domestic accident. Upon clinical examination, she exhibited external elbow pain but no swelling, sensory deficits, or vascular involvement.

Radiographic evaluation revealed an ascending capitellum with a characteristic "half-moon shape" on the anterior surface of the epiphysis (Fig. 1). A CT scan with 3D reconstruction (Fig. 2) was conducted to analyze the anatomical features of the fracture, confirming it as a type IV injury following the McKee [4] modification.

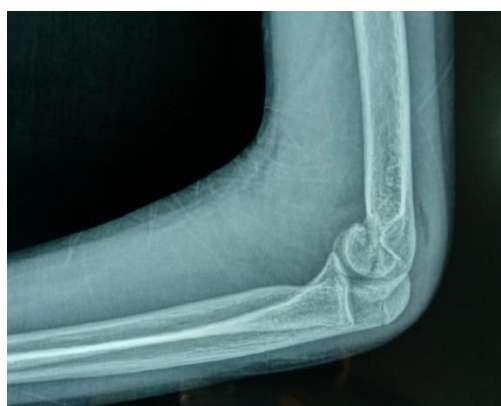
The intervention was performed under general anesthesia, an above elbow tourniquet was applied. A lateral approach was performed with an anterior detachment of the extensor mechanism.

Hohman retractors were placed at each side of the distal humerus. The articular surface was visualized anteriorly and the fracture was reduced using a reduction clamp and stabilized by two cancellous screws from posterior to anterior (Fig. 3).

The patient was placed in an above elbow half cast for six weeks post-surgery allowing full mobilization of the elbow.

After three months, the screws were removed, and the patient underwent two months of rehabilitation, resulting in excellent functional outcomes, including full range of motion and strength (Fig. 5).

There was no radiological evidence of avascular necrosis she had returned to full activities. She did not have any complaints. Final follow-up was conducted at 12 months. Patient was asymptomatic and X-rays did not reveal avascular necrosis (Fig. 4).

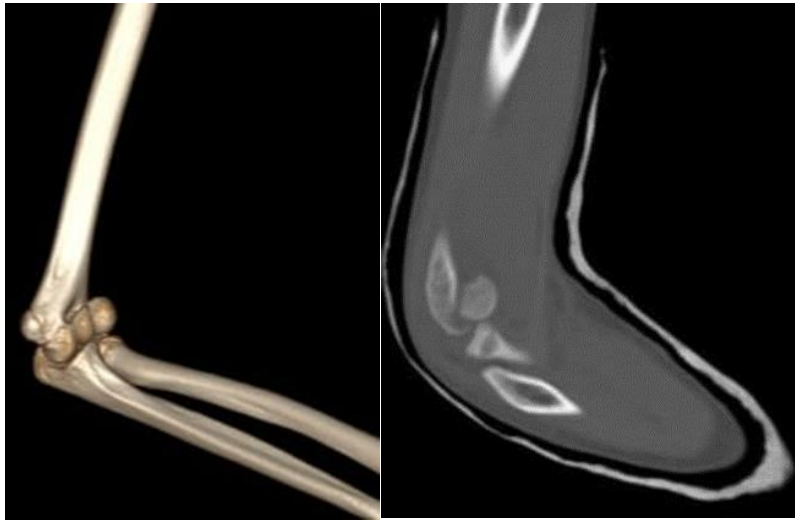


a)

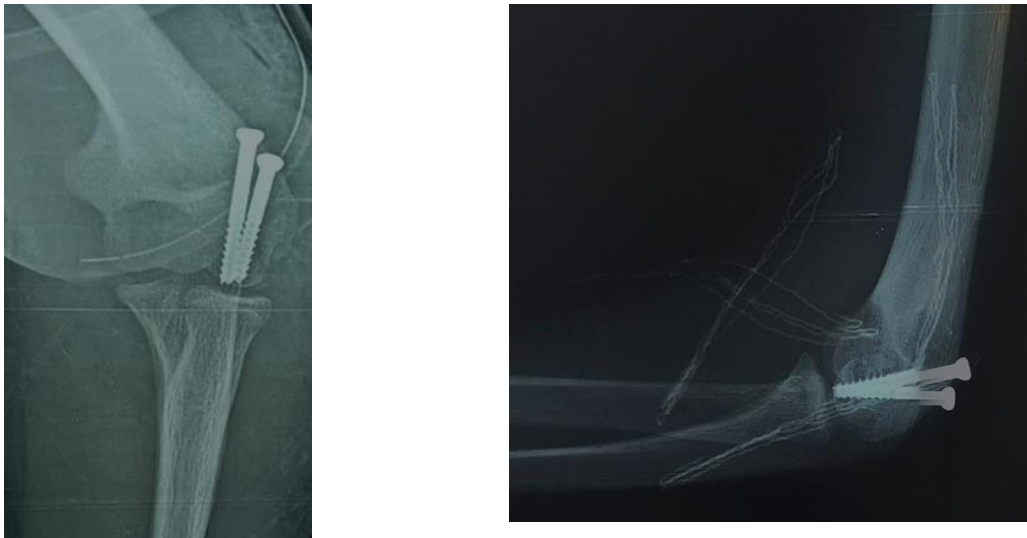


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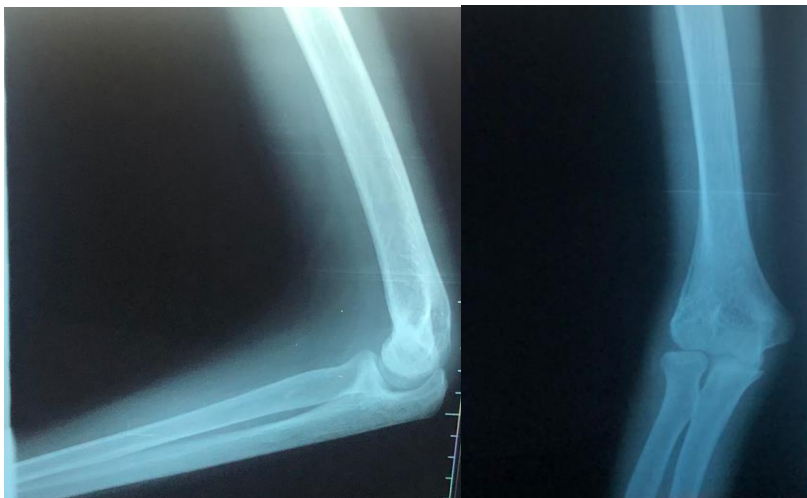
**Fig. 1. lateral (a) and anterior (b) xray showing a capitellar fracture with a specific double buddle aspect on the lateral view (a)**



**Fig. 2. Reconstructive CT images showing a typeIV Mckeel capitellum fracture**



**Fig. 3. Post-operative Xrays after reduction and fixation with antero-posterior Herbert screws**



**Fig. 4. X rays after one year follow up**



**Fig. 5. The patient regained a full range of motion**

### 3. DISCUSSION

“Capitellum fractures, in particular type IV McKee fractures are especially rare in the paediatric population. They can also be associated with ligamentous injuries (lateral or medial collateral ligament lesions) or ipsilateral fractures (radial head fractures or epicondylar fractures of humerus)” [5–9].

The original paper by McKee et al<sup>3</sup> reports “six type IV fractures including paediatric patients, treated by Open Reduction Internal Fixation (ORIF). One of these developed post-traumatic osteoarthritis. Mean follow up (FU) was 22 months and mean range of motion (ROM) was 15°–141°”.

“A recent case series reported six type IV fractures in adolescents treated with fully threaded compression screws and postero-anterior placement. These patients achieved full functional recovery, and none of them developed avascular necrosis. Mean FU was 24.6 months and mean flexion extension arc was 135°” [10].

“Another small case series reported one 15-year-old patient with a type IV fracture treated by partially threaded 4mm cancellous screws placed from posterior to anterior” [11].

“A 16-patient case series of both paediatric and adult patients included 8 type IV capitellum fractures, treated with acutrak screws. In this series, four patients developed post-traumatic arthrosis and six heterotopic ossification. Mean

FU was 27 months and mean flexion extension arc was 10°–133°” [4].

“A case series of 15 patients of both adults and adolescents included 3 type IV fractures. These were treated with fine threaded k-wires. In this series, eight patients developed post-trauma arthrosis. At a minimum of 12 months FU, they had a mean flexion extension ROM of 124°” [12].

“Finally, there was one case report of a type IV fracture in a 9-year-old girl with a bony avulsion of the lateral collateral ligament. It was treated by headless compression screws from anterior to posterior, and the associated injury was treated with anchor sutures. She was followed up at 6 months with no signs of avascular necrosis” [13].

To conclude, there are few type IV fractures in paediatric patients reported in the literature. They have been treated with different although similar means of fixation.

### 4. CONCLUSION

A displaced capitellum fracture must be anatomically reduced to restore articular congruity and regain a full range of motion. This goal is more often achieved by open reduction and internal fixation.

### CONSENT

As per international standards, parental written consent has been collected and preserved by the authors.

## ETHICAL APPROVAL

As per international standards or university standards written ethical approval has been collected and preserved by the authors.

## DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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