

## Case Report

# Medial Epicondyle and Capitellar Fractures in a 4-Year-Old Girl: A Case Report



Hiva Mohammadian<sup>1</sup>, Seyed Nima Taheri<sup>1</sup>, Shervin Lashgari<sup>2</sup>, Mohammad Soleimani<sup>3\*</sup>

1. Bone and Joint Reconstruction Research Center, Department of Orthopedics, School of Medicine, Iran University of Medical Sciences, Tehran, Iran.

2. Department of Physical Medicine and Rehabilitation, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

3. Department of Epidemiology, School of Medicine, Iran University of Medical Sciences, Tehran, Iran.



**Citation** Mohammadian H, Taheri SN, Lashgari Sh, Soleimani M. Medial Epicondyle and Capitellar Fractures in a 4-Year-Old Girl: A Case Report. *Journal of Research in Orthopedic Science*. 2022; 9(2):105-110. <http://dx.doi.org/10.32598/JROSJ.9.2.762.1>

**doi**: <http://dx.doi.org/10.32598/JROSJ.9.2.762.1>

### Article info:

**Received:** 28 Jan 2022

**Revised:** 01 Apr

**Accepted:** 23 Apr 2023

**Available Online:** 01 May 2022

### Keywords:

Open fracture reduction,  
Bone wires, Elbow joint,  
Fracture-dislocation, Case  
report

## ABSTRACT

Although medial epicondyle fractures are responsible for 12% of pediatric elbow fractures, they rarely occur concurrently with a capitellar fracture, and the treatment approach and indications are controversial. According to the case report (CARE) guidelines, here we present a case of the medial epicondyle and capitellar fractures with elbow dislocation in a 4-year-old girl who underwent K-wire fixation and splint application. After four months of follow-up, the patient showed good results and a full range of motion. Open reduction and internal fixation may be reasonable options for medial epicondyle and concomitant capitellar fractures using the medial and lateral approaches. We suggest using K-wires, especially in the pediatric population.

### \* Corresponding Author:

Mohammad Soleimani, MD.

**Address:** Department of Epidemiology, School of Medicine, Iran University of Medical Sciences, Tehran, Iran.

**Phone:** +98 (939) 4407275

**E-mail:** mohammad.soleimani.md@gmail.com



Copyright © 2024 The Author(s).  
This is an open access article distributed under the terms of the Creative Commons Attribution License (CC-BY-NC: <https://creativecommons.org/licenses/by-nc/4.0/legalcode.en>), which permits use, distribution, and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

## 1. Introduction

**F**ractures of the medial epicondyle account for approximately 12% of all pediatric elbow fractures [1]. These fractures are commonly seen in older children aged 7 to 15 years [2]. Moreover, these injuries occur predominantly in boys, about half of which involve elbow dislocations [3, 4]. However, combined medial epicondyle and capitellar fractures are rarely seen. Capitellar fractures are observed in less than 1% of all elbow fractures and usually occur in adults. Such fractures are rare in children because the capitellum is primarily cartilaginous by the age of 12 years [5, 6]. Several treatment options are recommended for capitellar fractures, including closed reduction, fragment excision, open reduction, and internal fixation (ORIF) [7]. With a better understanding of the condition, the preferred treatment is changing from closed reduction and excision to ORIF [8]. Given the brief descriptions of this injury, the preferred treatment, and the outcome in the literature, we present a case of the medial epicondyle and capitellum fracture and medial dislocation in a 4-year-old child. Since the patient was a minor, written informed consent was obtained from her parents, and according to the regulations of our institute, the need to obtain approval from the ethics committee was waived.

## 2. Case Presentation

A 4-year-old girl went to the emergency department after falling from a swing. She had pain, swelling, deformity, and ecchymosis in her left elbow and was unable to move her arm due to the pain. After the radiographic studies, fractures of the medial epicondyle and capitellum and medial dislocation of the elbow were diagnosed (Figure 1). She had no neurological or vascular complications.

The patient was transferred to the operating room on the same day. Under general anesthesia and in the supine position, both medial and lateral (Kocher) approaches were used. The ulnar nerve was explored and transposed after the medial incision. The fracture fragments were visualized with the naked eye and held with a bone clamp for fixation, and ORIF with K-wire was performed for medial epicondyle and capitellar fractures, respectively (Figure 2). The K-wires were delicately placed to preserve the neurovascular structure.

After ensuring the reduction of both fractures, a long arm splint of plaster of Paris was applied in 90° of flexion and mid-pronation for one month, and after one

month, K-wires were removed. Physiotherapy was not suggested, and the movements were taught to the parents and the patient.

The patient was regularly examined and followed up for four months, and after four months, the patient had a full range of motion and normal rotation. No signs of any complications, such as neural complications, were observed in the physical examination, and no signs of avascular necrosis (AVN) were observed in the radiographic study (Figures 3, 4).

The treatment, including one month of immobilization and K-wires and exercises, were well tolerated by the patient. Also, the parents and the patient were satisfied with the treatment results after four months.

## 3. Discussion

We described a case of the medial epicondyle and capitellar fractures with elbow dislocation in a girl following a fall. ORIF was performed for both fractures, and K-wires were used for fracture fixation. The patient showed a full range of motion and rotation and had no signs of complications after four months of follow-up.

The medial epicondyle is a distal humerus apophysis which is the last center of ossification of the distal humerus and is the origin of the flexor-pronator mass and ulnar collateral ligament [9]. Medial epicondyle fractures constitute almost 12% of all pediatric elbow fractures [1]. These fractures are usually seen in older children aged between 7 and 15 years, and the youngest reported patient was 3.9 years of age [2]. Also, such injuries occur mostly in boys with a ratio of 4:1 [10]. Moreover, about half of such injuries are associated with elbow dislocations [1, 11].

The mechanism of injury is usually a direct blow or valgus stress resulting in an avulsion fracture, e.g. falling on an outstretched arm, which is more common [7, 9]. Operative and nonoperative treatments have been described for such fractures. The goal of treatment is to prevent symptomatic nonunion and valgus instability [1]. The treatment approach, whether operative or nonoperative, depends on the fracture type (open or closed), elbow instability, displacement measurement, incarceration of fracture fragments, and the involvement of ulnar the nerve [9, 10]. However, controversy exists over the treatment and indications [9]. For operative treatment, the gold standard is ORIF using metal screws. Also, like lateral condyle fractures, ORIF is suggested for medial epicondyle fractures with more than two mm of displace-



**Figure 1.** Preoperative anteroposterior (AP) and lateral X-ray radiographs

Journal of Research in  
*Orthopedic Science*

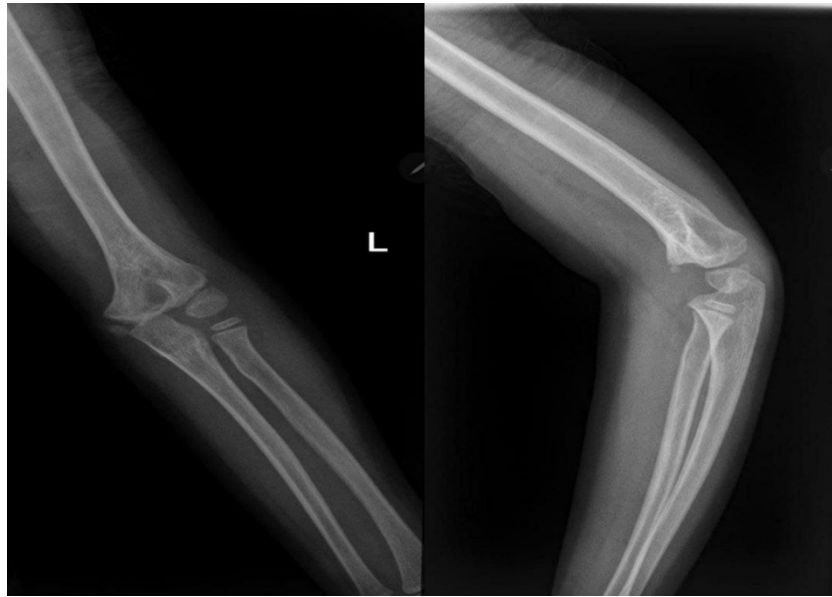
ment [12, 13]. Moreover, Kirschner wires (K-wires) are preferred in younger children [1]. Also, both supine and prone positionings have been described for medial epicondyle fractures [9].

Complications include valgus instability, ulnar nerve involvement, nonunion, pain, and limited range of motion. However, despite nonunion in many patients, high levels of function have been reported in patients after long-term follow-up. Most authors suggest early mo-



**Figure 2.** Postoperative anteroposterior (AP) X-ray radiograph

Journal of Research in  
*Orthopedic Science*



**Figure 3.** Anteroposterior (AP) and lateral X-ray radiographs after four months

Journal of Research in  
**Orthopedic Science**

bilization after 7-10 days of immobilization to prevent stiffness [9].

Capitellar fractures are rare and constitute less than 1% of all elbow fractures [11]. Since this injury not only involves the articular surface but also may disrupt physics [14]. This fracture usually occurs in older patients, and to the best of our knowledge, this 4-year-old girl is the youngest ever reported. The proposed mechanism of injury is injury from falling on an outstretched arm with the elbow extended [10].

Although several classification systems have been described, Bryan and Morrey’s classification is common-

ly used [15]. Type I or Hahn-Steinhal type is the most common and involves the capitellum and the cancellous bone underneath [5]. Various treatments have been proposed over the years, including closed reduction, excision, open reduction with or without internal fixation, and prosthetic arthroplasty [15]. The use of K-wires cannulated cancellous screws, and Herbert screws have been reported in the literature for internal fixation of the condition.

This case was a medial epicondyle fracture with a concurrent type I capitellum fracture and medial elbow dislocation. This association is rarely observed, and we treated both fractures with K-wires, and good



**Figure 4.** Full range of motion and complete rotation

Journal of Research in  
**Orthopedic Science**

results were observed after four months of follow-up. We found a study dating back to 1985, which described the same condition of the concomitant medial epicondyle and capitellum fractures in a 14-year-old girl after a fall [16]. They reported a posterior elbow dislocation with a minimally displaced medial epicondyle fracture and a concomitant capitellum fracture, and they used closed reduction for the dislocation and, after 10 days, excised the capitellum fragments because they were not reduced. However, after one year, nonunion of the medial epicondyle was observed, although the patient was asymptomatic. We preferred to fix both fractures with K-wires, thereby bridging both fractures. We also used two separate incisions to fix the fractures since an incision cannot provide optimal access.

ORIF is suggested for combined medial epicondyle and capitellar fractures using medial and lateral approaches. K-wires are preferred in very young patients. Also, our patient showed promising results and optimal range of motion, supination, and pronation after one month of immobilization.

## Ethical Considerations

### Compliance with ethical guidelines

All ethical principles were considered in this article. The participants were informed of the purpose of the research and its implementation stages. They were also assured about the confidentiality of their information and were free to leave the study whenever they wished, and if desired, the research results would be available to them.

### Funding

This research did not receive any grant from funding agencies in the public, commercial, or non-profit sectors.

### Authors' contributions

All authors equally contributed to preparing this article.

### Conflict of interest

The authors declared no conflict of interest.

## References

- [1] Patel NM, Ganley TJ. Medial epicondyle fractures of the humerus: How to evaluate and when to operate. *J Pediatr Orthop.* 2012; 32(Suppl 1):S10-3. [DOI:10.1097/BPO.0b013e31824b2530] [PMID]
- [2] Chessare JW, Rogers LF, White H, Tachdjian MO. Injuries of the medial epicondylar ossification center of the humerus. *AJR Am J Roentgenol.* 1977; 129(1):49-55. [DOI:10.2214/ajr.129.1.49] [PMID]
- [3] Beck JJ, Bowen RE, Silva M. What's new in pediatric medial epicondyle fractures? *J Pediatr Orthop.* 2018; 38(4):e202-6. [DOI:10.1097/BPO.0000000000000902] [PMID]
- [4] Knapik DM, Fausett CL, Gilmore A, Liu RW. Outcomes of nonoperative pediatric medial humeral epicondyle fractures with and without associated elbow dislocation. *J Pediatr Orthop.* 2017; 37(4):e224-8. [DOI:10.1097/BPO.0000000000000890] [PMID]
- [5] Letts M, Rumball K, Bauermeister S, McIntyre W, D'Astous J. Fractures of the capitellum in adolescents. *J Pediatr Orthop.* 1997; 17(3):315-20. [PMID]
- [6] Hill CE, Cooke S. Common paediatric elbow injuries. *Open Orthop J.* 2017; 11:1380-93. [DOI:10.2174/187432500171101380] [PMID] [PMCID]
- [7] He SK, Xu L, Guo JH, Liao JP, Qin TW, Huang FG. The impact of associated injuries and fracture classifications on the treatment of capitellum and trochlea fractures: A systematic review and meta-analysis. *Int J Surg.* 2018; 54(Pt A):37-47. [DOI:10.1016/j.ijsu.2018.04.028] [PMID]
- [8] Singh AP, Singh AP, Vaishya R, Jain A, Gulati D. Fractures of capitellum: A review of 14 cases treated by open reduction and internal fixation with Herbert screws. *Int Orthop.* 2010; 34(6):897-901. [DOI:10.1007/s00264-009-0896-9] [PMID] [PMCID]
- [9] Pathy R, Dodwell ER. Medial epicondyle fractures in children. *Curr Opin Pediatr.* 2015; 27(1):58-66. [DOI:10.1097/MOP.000000000000181] [PMID]
- [10] Fowles JV, Slimane N, Kassab MT. Elbow dislocation with avulsion of the medial humeral epicondyle. *J Bone Joint Surg Br.* 1990; 72(1):102-4. [DOI:10.1302/0301-620X.72B1.2298765] [PMID]
- [11] Kocher MS, Waters PM, Micheli LJ. Upper extremity injuries in the paediatric athlete. *Sports Med.* 2000; 30(2):117-35. [DOI:10.2165/00007256-200030020-00005] [PMID]
- [12] Najd Mazhar F, Shariatzadeh H, Jafari D, Taghavi R, Dehghani Nazhvani H. Surgical outcome of pediatric medial humeral epicondylar fracture with a displacement of more than 2 millimeters. *J Res Orthop Sci.* 2019; 6(1):e85917. [DOI:10.5812/soj.85917]
- [13] Jafari D, Shariatzadeh H, Najd Mazhar F, Jafari S, Tabrizian P. Clinical and radiological results of open reduction and internal fixation for the treatment of lately presented lateral humeral condyle fractures in children. *J Res Orthop Sci.* 2018; 5(2):e69238. [DOI:10.5812/soj.69238]
- [14] Cornelius AL, Bowen TR, Mirenda WM. Anterolateral approach for an unusual pediatric capitellar fracture: A case report and review of the literature. *Iowa Orthop J.* 2012; 32:215-9. [PMID]
- [15] Dubberley JH, Faber KJ, MacDermid JC, Patterson SD, King GJ. Outcome after open reduction and internal fixation of capitellar and trochlear fractures. *J Bone Joint Surg.* 2006; 88(1):46-54. [Link]

- [16] Hendel D, Aghasi M, Halperin N. Unusual fracture dislocation of the elbow joint. *Arch Orthop Trauma Surg* (1978). 1985; 104(3):187-8. [[DOI:10.1007/BF00454697](https://doi.org/10.1007/BF00454697)] [[PMID](#)]