

Surgical Management of Flexion Type Supracondylar Humeral Fracture With Ulnar Nerve Injury - A Report of a Rare Case

Review began 06/14/2022
Review ended 06/28/2022
Published 06/29/2022

© Copyright 2022

Vellingiri et al. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY 4.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Kishore Vellingiri ^{1, 2}, Meenakshi S. Andra Suryanarayana ³, Balasaranaya Sambathkumar ⁴, Hariprasad Seenappa ⁵

1. Hand Surgery, Kasturba Medical College of Manipal, Manipal, IND 2. Orthopedics, Sri Devaraj Urs Academy of Higher Education and Research, Kolar, IND 3. Biochemistry, Peelamedu Samanaidu Govindasamy Institute of Medical Sciences and Research, Coimbatore, IND 4. Medicine, Coimbatore Medical College, Coimbatore, IND 5. Orthopedics, Sri Devaraj Urs Academy of Higher Education and Research, Kolar, IND

Corresponding author: Hariprasad Seenappa, drhariprasad.ortho@gmail.com

Abstract

Supracondylar humerus fractures in children account for up to two-thirds of pediatric elbow injuries that require hospitalization. Supra-condylar fractures usually occur due to falls from height, from sports, or through acts of leisure. The estimation of their incidence is about 177.3 per 100000. Here, we report a successfully managed case of flexion-type supra-condylar fracture of the humerus with ulnar nerve injury without any complications.

Categories: Radiology, Orthopedics, Trauma

Keywords: ulnar clawing, kirschner wire, ulnar nerve injury, flexion type, supra-condylar fracture humerus

Introduction

Supra-condylar fractures of the humerus account for 55% to 80% of total elbow fractures [1]. These fractures in children account for up to two-thirds of pediatric elbow injuries that require hospitalization [1]. Supra-condylar fractures usually occur due to falls from height, from sports, or from acts of leisure. The estimation of their incidence is about 177.3 per 100000 [2]. Flexion-type fractures represent about 1% to 3% of cases. The most common cause of supra-condylar fracture is usually direct trauma to the flexed elbow [3]. We report the successful management of delayed presentation of flexion-type supracondylar fracture of the humerus with ulnar nerve injury without any complications.

This case study was presented as a poster at the 64th Annual Conference of the Indian Orthopedic Association (IOACON 2019) held between the 19th and 24th of November 2019 in Kolkata, India. The abstract of this article is published in the online supplement of the conference journal.

Case Presentation

A 10-year-old female patient was brought to our tertiary care center at Kolar, Karnataka, with an alleged history of a fall when she sustained an injury over her left upper limb three weeks following the initial injury. The patient presented with swelling and pain over her left elbow with the inability to move her left little finger since the fall. She had no history of injuries elsewhere in her body. On examination, the left elbow joint was tender, grossly swollen, and in a slightly extended position. The three-point relation could not be assessed due to the swelling. The range of motion at the left elbow joint was painful and restricted. Sensation was lost in her left little finger, and extension of all other fingers was present. Brachial artery pulsation was palpable, and no vascular deficits were noticed. Anti-edema measures were taken through limb elevation over the pillow, above elbow plaster of Paris slab application in extension, and medications. Analgesics and prophylactic antibiotics were started, and the dosage was as per the weight of the child. The patient was sent for a plain radiograph of the left elbow joint. Radiographs showed left supracondylar fracture with gross rotational anterolateral displacement, as shown in Figure 1. As a trial, closed manipulation was attempted, and it failed as expected. After obtaining proper written, informed consent from her guardian, the patient underwent open reduction and internal fixation with two criss-cross Kirschner wire fixations, as shown in Figure 2, and above-the-elbow slab immobilization for four weeks.

How to cite this article

Vellingiri K, Andra Suryanarayana M S, Sambathkumar B, et al. (June 29, 2022) Surgical Management of Flexion Type Supracondylar Humeral Fracture With Ulnar Nerve Injury - A Report of a Rare Case. Cureus 14(6): e26433. DOI 10.7759/cureus.26433

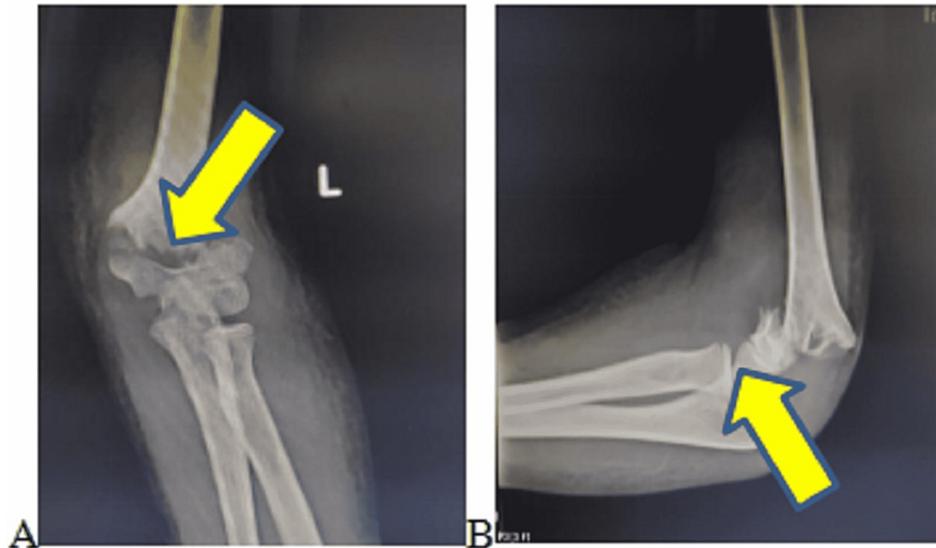


FIGURE 1: Plain radiograph of left elbow (A) antero-posterior view and (B) lateral view showing left supracondylar fracture with gross rotational anterolateral displacement

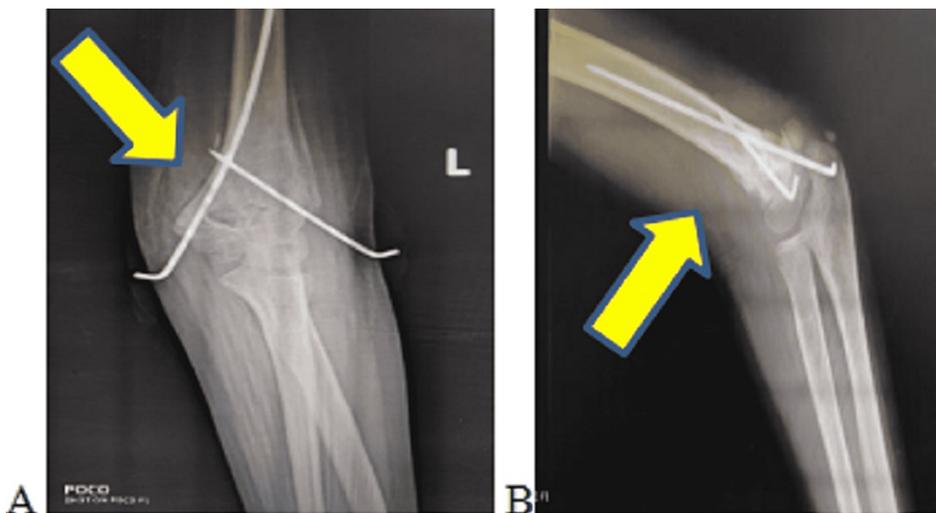


FIGURE 2: Plain radiographs of the left elbow (A) antero-posterior view and (B) lateral view showing Kirschner wire fixation for left supracondylar fracture with gross rotational anterolateral displacement

Hospital course

Postoperatively, the patient received intravenous amoxicillin-potassium clavulanate twice daily for seven days, followed by oral amoxicillin-potassium clavulanate twice daily for seven days (dosage was based on the weight of the patient). A postoperative radiograph of the operated elbow joint is shown in Figure 2. The three-month follow-up plain radiograph of the left elbow joint is shown in Figure 3. The bilateral carrying angle was more on the left side, as shown in Figure 4. Ulnar nerve clawing over the left little finger was corrected, as shown in Figure 5. Ulnar nerve injury recovered on its own, possibly neuropraxia. During the last follow-up, six months post-injury, the patient had recovered from ulnar claw hand and had gained a successful full range of motion over her left elbow joint, as shown in Figure 6.

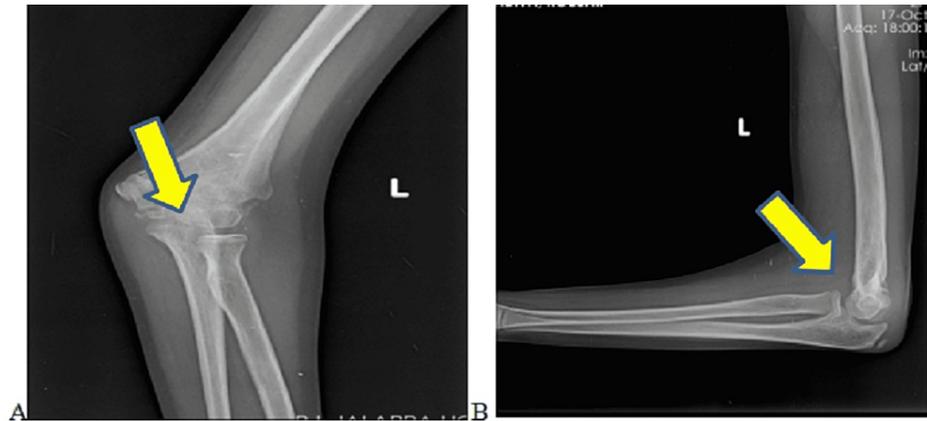


FIGURE 3: Plain radiographs of the left elbow (A) antero-posterior and (B) lateral views at three months follow-up



FIGURE 4: Bilateral carrying angle more in the left side



FIGURE 5: Ulnar clawing corrected over the left little finger



FIGURE 6: Clinical picture of (A) elbow extension and (B) elbow flexion showing successful functional range of motion after surgical management

Discussion

Flexion-type accounts for a minority of all supracondylar fractures of the humerus, and they warrant special attention. This is due to the high rate of necessity for open reduction and their potential for ulnar nerve injury or entrapment. Non-displaced or minimally displaced flexion-type supra-condylar fractures of the humerus can be treated with long arm casting. Displaced flexion-type supra-condylar humerus fractures require surgical reduction and stabilization [4]. 6.5% to 19% of cases of displaced fractures present with neural injuries, and such injuries are uncommon in non-displaced fractures [5].

Injuries can be either primary lesions (appearing before surgery) or secondary lesions (appearing after reduction and fixation of the fracture). Stretching, entrapment, or disruption of the nerve can happen during primary lesions caused by fracture displacement. Immobilization during hyperflexion, iatrogenic injuries by fixation, or excessive manipulation may lead to secondary lesions [6,7]. Pinning errors were significantly more frequent in surgeries performed at night [8]. Delniotos et al. in their study proposed that orthopedic surgeons should be aware, and family members of those patients should be informed, that the likelihood of an open reduction in flexion-type supracondylar fracture is extremely high. Open reduction is needed not only to achieve an anatomic reduction of the fracture but to make sure that the ulnar nerve is not entrapped between the proximal and distal fragment [9].

Valle-Hernandez et al., in their study, noted that the neurological complication rates were 10% (33 patients). Neurologic complications after displacement of the distal fragment were 13.5% for posteromedial displacement and 11.8% for postero-lateral displacement. The female-to-male ratio, fracture type, and complications (e.g., infection, vascular and neurologic) were similar to those reported in the literature [10]. Green et al., in their article, demonstrated that crossed-pin fixation can be performed safely and reliably and is an appropriate treatment option for unstable supracondylar fractures of the humerus [11].

Conclusions

The patient in our case report with delayed presentation had a successful clinical outcome and functional range of motion after Kirschner's wire fixation. Successfully treating the flexion-type supracondylar fractures and neurological deficit is a challenge. Patients and families should be counseled regarding the high rate of open reduction for flexion-type supracondylar fractures of the humerus, particularly those with an associated ulnar nerve injury.

Additional Information

Disclosures

Human subjects: Consent was obtained or waived by all participants in this study. Institutional Ethics Committee of Sri Devaraj Urs Medical College issued approval DMC/KLR/IEC/103/2019-20. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

References

1. Omid R, Choi PD, Skaggs DL: Supracondylar humeral fractures in children . *J Bone Joint Surg Am*. 2008, 90:1121-32. [10.2106/JBJS.G.01354](https://doi.org/10.2106/JBJS.G.01354)
2. Mulpuri K, Hosalkar H, Howard A: AAOS clinical practice guideline: the treatment of pediatric supracondylar humerus fractures. *J Am Acad Orthop Surg*. 2012, 20:328-30. [10.5435/JAAOS-20-05-328](https://doi.org/10.5435/JAAOS-20-05-328)
3. Vaquero-Picado A, González-Morán G, Moraleda L: Management of supracondylar fractures of the humerus in children. *EFORT Open Rev*. 2018, 3:526-40. [10.1302/2058-5241.3.170049](https://doi.org/10.1302/2058-5241.3.170049)
4. Bouton D, Ho CA, Abzug J, Brighton B, Ritzman TF: The difficult supracondylar humerus fracture: flexion-type injuries. *Instr Course Lect*. 2016, 65:371-7.
5. Bashyal RK, Chu JY, Schoenecker PL, Dobbs MB, Luhmann SJ, Gordon JE: Complications after pinning of supracondylar distal humerus fractures. *J Pediatr Orthop*. 2009, 29:704-8. [10.1097/BPO.0b013e3181b768ac](https://doi.org/10.1097/BPO.0b013e3181b768ac)
6. Gosens T, Bongers KJ: Neurovascular complications and functional outcome in displaced supracondylar fractures of the humerus in children. *Injury*. 2003, 34:267-73.
7. Valencia M, Moraleda L, Díez-Sebastián J: Long-term functional results of neurological complications of pediatric humeral supracondylar fractures. *J Pediatr Orthop*. 2015, 35:606-10. [10.1097/BPO.0000000000000337](https://doi.org/10.1097/BPO.0000000000000337)
8. Battle J, Carmichael KD: Incidence of pin track infections in children's fractures treated with Kirschner wire fixation. *J Pediatr Orthop*. 2007, 27:154-7. [10.1097/bpo.0b013e3180317a22](https://doi.org/10.1097/bpo.0b013e3180317a22)
9. Delniotis I, Dionellis P, Gekas CC, et al.: Flexion-type supracondylar humeral fracture with ulnar nerve injury in children: two case reports and review of the literature. *Am J Case Rep*. 2020, 21:e921293. [10.12659/AJCR.921293](https://doi.org/10.12659/AJCR.921293)
10. Del Valle-Hernández E, Marrero-Barrera PA, Beaton D, Bravo D, Santiago S, Guzmán-Pérez H, Ramos-Alconini N: Complications associated with pediatric supracondylar humeral fractures . *P R Health Sci J*. 2017, 36:37-40.
11. Green DW, Widmann RF, Frank JS, Gardner MJ: Low incidence of ulnar nerve injury with crossed pin placement for pediatric supracondylar humerus fractures using a mini-open technique. *J Orthop Trauma*. 2005, 19:158-63. [10.1097/00005131-200503000-00002](https://doi.org/10.1097/00005131-200503000-00002)