



# Supracondylar Humeral Fracture in a Child Managed with Modified Cross Pinning (Two Lateral and One Medial K-Wire): Case Report with Literature Review

Ahmed Dervis

Department of Orthopedic Surgery, Soliman Kanoni Hospital, Istanbul, Türkiye  
Email: ahmeddarwish908@yahoo.com

**How to cite this paper:** Dervis, A. (2025) Supracondylar Humeral Fracture in a Child Managed with Modified Cross Pinning (Two Lateral and One Medial K-Wire): Case Report with Literature Review. *Open Access Library Journal*, 12: e14462. <https://doi.org/10.4236/oalib.1114462>

**Received:** October 15, 2025

**Accepted:** November 3, 2025

**Published:** November 6, 2025

Copyright © 2025 by author(s) and Open Access Library Inc.

This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

## Abstract

Supracondylar humeral fractures are the most common pediatric elbow fractures and often require operative stabilization. While cross pinning provides superior biomechanical stability, it carries the risk of iatrogenic ulnar nerve injury. We report the case of a 7-year-old girl with a displaced Gartland type III supracondylar humeral fracture—defined as a completely displaced fracture with no cortical contact—managed with closed reduction and modified cross pinning using two lateral and one medial K-wires. The technique provided excellent stability, avoided neurovascular complications, and resulted in full functional recovery. A brief review of the literature is presented to contextualize the role of modified cross pinning in current pediatric orthopedic practice.

## Subject Areas

Orthopedics

## Keywords

Supracondylar Humeral Fracture, Case Report, Pediatric Orthopedic Practice

## 1. Introduction

Supracondylar fractures of the humerus represent 50 - 60% of pediatric elbow fractures and typically occur in children aged 5 - 10 years following a fall on an outstretched hand [1]. Closed reduction and percutaneous pinning are the treatment of choice for displaced fractures, with the goal of preventing malunion, stiffness, and neurovascular complications [2]. Pin configuration remains a subject of debate. Lateral-only pinning is widely used due to its safety profile regarding the

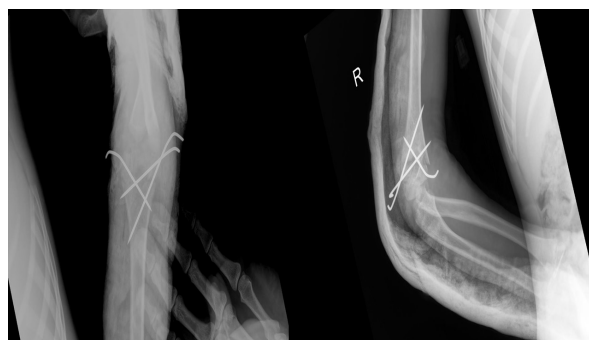
ulnar nerve but may lack sufficient stability in high-grade fractures [3]. Crossed medial-lateral pinning provides superior mechanical stability but carries a reported risk of iatrogenic ulnar nerve injury between 3% and 8% [4]. Modified cross pinning, using two lateral and one medial pin, is proposed as a compromise technique, balancing stability with safety.

## 2. Case Presentation

A 7-year-old right-hand-dominant girl presented to the Emergency Room of the Orthopedics Department at Kanuni Sultan Suleyman Hospital, Istanbul, Türkiye, with pain, swelling, and deformity of the right elbow after falling from a swing. Examination revealed swelling, tenderness, and restricted motion but no neurovascular compromise. Radiographs confirmed a Gartland type III extension-type supracondylar fracture (Figure 1). After completion of pre-operative assessments, closed reduction was achieved under general anesthesia. Two divergent lateral 1.6 mm K-wires were placed percutaneously, but rotational instability was detected intra-operatively by gentle flexion-extension and pronation-supination under fluoroscopy. A medial pin was then carefully inserted with the elbow slightly extended and the medial epicondyle palpated to avoid the ulnar nerve. Fluoroscopy confirmed stable fixation (Figure 2). The limb was immobilized in an above-elbow backslab. At 3 weeks, radiographs showed good alignment and callus formation. K-wires were removed at 6 weeks. At 3 months, the patient achieved a pain-free,



**Figure 1.** Preoperative anteroposterior and lateral radiographs showing a displaced Gartland type III supracondylar humeral fracture.



**Figure 2.** Postoperative fluoroscopic images demonstrating fixation with two lateral and one medial K-wires achieving stable reduction.

full range of motion (0 - 135° flexion-extension, full pronation-supination) without deformity or complications. Neurovascular assessment of the right upper extremity was normal.

### 3. Discussion

Stability and safety are the cornerstones of supracondylar fracture fixation. Biomechanical studies demonstrate that crossed pinning provides greater torsional and varus-valgus stability than lateral-only pinning [5]. However, the risk of ulnar nerve injury during medial pin placement remains a concern; some authors use ultrasonography to guide pinning [6]. Modified cross pinning using two lateral and one medial wire has been studied as a compromise [7]. This configuration improves fracture stability compared with lateral-only pinning while maintaining a lower risk of nerve injury, especially when medial pin insertion is performed with the elbow extended and careful soft tissue handling [3]. The use of 1.6 mm K-wires in this school-aged child was chosen to minimize the risk of cortical cracking and facilitate smooth percutaneous insertion; smaller wires have been shown to provide sufficient stability in children under 8 years [7]. This case supports growing evidence that modified cross pinning is a reliable and safe method, particularly in unstable Gartland type III fractures where lateral-only pins fail to provide adequate stability. A limitation of this report is the short follow-up period (3 months); longer observation would be valuable to confirm sustained alignment, remodeling, and full long-term function.

### 4. Conclusion

Modified cross pinning with two lateral and one medial K-wires is an effective fixation technique for unstable supracondylar humeral fractures in children. It provides stability comparable to traditional crossed pinning while minimizing the risk of iatrogenic ulnar nerve injury when performed with meticulous technique.

#### Key Points

- Gartland type III fractures indicate complete displacement requiring operative stabilization.
- Modified cross pinning (two lateral + one medial) offers a balance of safety and stability.
- 1.6 mm K-wires are adequate for younger children, reducing cortical stress during insertion.
- Careful technique and short-term results are promising, but longer follow-up is advised.

### Conflicts of Interest

The author declares no conflicts of interest.

### References

- [1] Hope, N. and Varacallo, M.A. (2025) Supracondylar Humerus Fractures. StatPearls

Publishing. <https://www.ncbi.nlm.nih.gov/books/NBK560933/>

- [2] Mazhar, F.N. and Motaghi, P. (2023) Closed Reduction and Percutaneous Pinning for Treatment of Proximal Interphalangeal Joint Pilon Fractures. *HAND*, **18**, 40-47. <https://doi.org/10.1177/1558944721990774>
- [3] Mannan, M., Eisha, S. and Afridi, A. (2024) A Comparison of Nerve Injury in Cross versus Lateral Pinning Fixation of Displaced Supracondylar Humerus Fracture. *Cureus*, **16**, e70404. <https://doi.org/10.7759/cureus.70404>
- [4] Zhao, H., Xu, S., Liu, G., Zhao, J., Wu, S. and Peng, L. (2021) Comparison of Lateral Entry and Crossed Entry Pinning for Pediatric Supracondylar Humeral Fractures: A Meta-Analysis of Randomized Controlled Trials. *Journal of Orthopaedic Surgery and Research*, **16**, Article No. 366. <https://doi.org/10.1186/s13018-021-02505-3>
- [5] Kaya, Ö., Gencer, B., Çulcu, A. and Doğan, Ö. (2023) Extra Lateral Pin or Less Radiation? a Comparison of Two Different Pin Configurations in the Treatment of Supracondylar Humerus Fracture. *Children*, **10**, Article 550. <https://doi.org/10.3390/children10030550>
- [6] Wu, X., Chen, X., Li, X., Wang, T., Li, J. and Shen, X. (2025) Ultrasound-Guided Cross-Pin Technique for Paediatric Supracondylar Humerus Fractures: Minimizing Iatrogenic Ulnar Nerve Injury. *BMC Musculoskeletal Disorders*, **26**, Article No. 792. <https://doi.org/10.1186/s12891-025-09001-3>
- [7] Paramasivam, D., Ramachandran, T., Ravindranath, T.P., Raja, D. and Sellakrishnan, A. (2022) Outcome Analysis of Cross-Pinning versus Lateral Pinning and Various Lateral Pinning Configuration in the Treatment of Displaced Paediatric Supracondylar Humerus Fracture. *International Journal of Research in Orthopaedics*, **8**, 463-469. <https://doi.org/10.18203/issn.2455-4510.intjresorthop20221623>