

Iatrogenic Ulnar Nerve Injury After Surgical Fixation for Supracondylar Humerus Fracture in Children

Dr Kishore V¹, Dr Varshama Tharun², Dr Kodali Manvitha³

¹Assistant Professor, Department of Orthopaedics, Konaseema Institute of Medical Sciences (KIMS) Amalapuram, 533201

²Post Graduate, Department of Orthopaedics, Konaseema Institute of Medical Sciences (KIMS) Amalapuram, 533201

³Post Graduate, Department of Orthopaedics, Konaseema Institute of Medical Sciences (KIMS) Amalapuram, 533201

Abstract: *This case report examines the occurrence and management of iatrogenic ulnar nerve injury following surgical fixation of a supracondylar humerus fracture in a pediatric patient. Despite the rarity of such injuries, their incidence increases with crossed K - wire fixation. The report details a 7 - year - old boy who developed ulnar nerve dysfunction, presenting with claw hand and sensory deficits, one month post - surgery. Initial conservative treatment with K - wire removal failed, leading to surgical exploration which revealed nerve entrapment in fibrous tissue. Post - surgical outcomes showed significant improvement in sensory and motor functions. The discussion emphasizes the importance of minimizing medial pinning, using a mini - open approach when necessary, and the necessity for prompt identification and treatment of nerve injuries to prevent permanent damage.*

Keywords: ulnar nerve injury, supracondylar humerus fracture, K - wire fixation, pediatric orthopedics, nerve entrapment

1. Introduction

Ulnar nerve is rarely injured as a result of supracondylar humerus fractures, but it is the most commonly injured nerve after surgical fixation of supracondylar fractures of humerus in children with an incidence of 2% - 6%^{1,2}. There is a debate regarding lateral only versus crossed wire fixation as crossed wire fixation carries more risk of ulnar nerve injury³. This can be decreased to 0.4% - 1.8% with mini - open approach while placing medial wires^{4,5}.

It is thought that the process of traction and reduction of fracture along with the swelling can cause transient neuropraxia of ulnar nerve which can resolve with time. But sometimes these iatrogenic ulnar nerve injuries also caused by direct trauma from K - wire insertion, compression of k wires causing cubital tunnel syndrome, nerve entrapment between fracture ends or rarely thermal injury⁶.

There are no clear guidelines regarding the approach to treat these iatrogenic injuries. Some authors prefer to wait for 2 - 3 months for spontaneous recovery^{7,8}, while others prefer

immediate exploration of nerve^{2,9}. We report a case of iatrogenic ulnar nerve injury after surgical fixation of supracondylar humerus with crossed k - wires.

2. Case Report

A 7 years old boy sustained injury to left elbow while playing brought to emergency room and X - ray showed displaced distal humerus fracture (Gartland type 3) without any neurovascular deficits. Pt was operated with in 6 hrs of injury on emergency and fracture fixation was done with percutaneous k - wires in crossed manner. Immediate post op pt was alright and after discharge pt skipped the reviews and reported to OPD after 1 month with claw hand. Pt was not able to completely extend his 4th and 5th fingers at PIP joint, 1st dorsal interosseous wasting is seen and had decreased sensations on the little finger.

K - wires were removed immediately and pt reviewed after 2 weeks and the condition didn't improve. A nerve conduction study was done and the impression was Left ulnar nerve severe sensory motor axonal neuropathy.



Figure 1: a) Pre - Operative x - ray showing Gartland Type 3 supracondylar humerus fracture b) Post - Operative x - ray showing fracture fixation with crossed k - wires.

Pt was planned for nerve exploration and intraoperatively it was observed that the nerve continuity is maintained but it is entrapped in the fibrous tissue formed near the medial k - wire

insertion site. Fibrous adhesions were removed and nerve is freed.



Figure 2: a) Intra operative picture showing Ulnar nerve trapped in fibrous tissue. b) Ulnar nerve is freed from adhesions

After 1 month follow up there is improvement in sensory sensations of little finger and extension of 4th and 5th fingers. After 2 month follow up patient showed full recovery and regained normal range of movement.



Figure 3: a) pt having ulnar claw hand 1 - month post k - wire fixation. b) 6 - months follow - up picture showing complete recovery

3. Discussion

Supracondylar humerus fractures are most common orthopaedic injuries in children. Treatment option varies from above elbow cast to surgical management by k - wire fixation. In displaced fractures closed reduction and pinning is preferred. Different techniques were reported but crossed wire fixation and post op immobilization is the usual option for many surgeons¹⁰.

Ulnar nerve can get injured or stretched during traction or reduction. Implant also add an additional risk to the nerve by direct injury or by compression¹¹.

Recent literature suggests that the incidence of ulnar nerve injury in case of crossed k - wires can be decreased greatly with mini - open procedure while placing medial wire as it gives direct visualisation of the nerve and exact site of k - wire insertion¹².

If at all the nerve injury occurs, there is an ambiguity regarding the treatment approach. Regularly used practise are k - wire removal + casting, k - wire removal + wire repositioning, exploration + repositioning of wires, exploration + repositioning + cubital retinacular release^{13, 14}. Some authors say to wait and watch for spontaneous recovery. Some advice to go for early exploration as delayed exploration may lead to permanent damage and may result in permanent deformity.

4. Conclusion

From our experience and multiple authors recommendations we strongly believe these points.

- 1) Avoid medial pinning as much as possible, prefer divergent lateral pinning configuration and apply a cast if reduction is stable.
- 2) If medial pinning is required (As in case of medial comminution of fracture) prefer mini - open technique, avoid percutaneous pinning on medial condyle of humerus.
- 3) Identify iatrogenic ulnar nerve injury as soon as possible after surgery. Removal of k - wires and close followup for nerve recovery and function is required
- 4) If identified late during followup, early decompress the nerve with or without repositioning is preferred.
- 5) Regular follow up of patient is required to monitor progress of nerve recovery.

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