

# Isolated Paralysis of Extensor Indicis and EDC Tendon of Index Finger Following Thompson's Approach to Proximal Radius-Case Report

Jagannadham PVSSM, Sivani V\*

Department of Orthopaedics, Gayatri Vidya Parishad Institute of Health Care and Medical Technology, Vishakhapatnam, Andhra Pradesh, India

## ABSTRACT

Fracture both bones forearm is one of the commonly encountered fracture in orthopaedics, for which open reduction and internal fixation is needed to get anatomical reduction. For proximal third and middle third junction fractures of radius, dorsal plating using Thompson's approach is in vogue. However, it is associated with injury of Posterior Interosseous Nerve (PIN) leading to the weakness of extension of Metacarpophalangeal (MCP) joints of fingers and Interphalangeal joint (IP joint) of thumb. Usually, all the fingers are equally affected. But in this the case report, a rare presentation of weakness of extension of MCP joint of index finger alone in a 28-year-old male patient following open reduction internal fixation using Thompson's approach is observed.

## KEYWORDS

Open reduction internal fixation, Thompson's approach, Metacarpophalangeal (MCP), Posterior Interosseous Nerve (PIN), Interphalangeal joint

\*

*Corresponding Author:*

*Sivani V, Department of Orthopaedics, Gayatri Vidya Parishad Institute of Health Care and Medical Technology, Vishakhapatnam, Andhra Pradesh, India; E-mail: sivavarigonda@gmail.com*

*How to Cite This Article:*

*Jagannadham PVSSM, Sivani V. Isolated Paralysis of Extensor Indicis and EDC Tendon of Index Finger Following Thompson's Approach to Proximal Radius- Case Report. J Evid Based Med Healthc 2025;12(01):1-3.*

*Received: 22-March-2024;*

*Manuscript No: JEBMH-24-130454;*

*Editor assigned: 25-March-2024;*

*PreQC No. JEBMH-24-130454 (PQ);*

*Reviewed: 08-April-2024;*

*QC No. JEBMH-24-130454;*

*Revised: 21-March-2025;*

*Manuscript No. JEBMH-24-130454 (R);*

*Published: 28-March-2025;*

*DOI: 10.18410/jebmh/2025/12/01/136.*

*Copyright © 2025 Sivani V, et al. This is an open access article distributed under Creative Commons Attribution License [Attribution 4.0 International (CC BY 4.0)]*

**INTRODUCTION**

The Thompson's approach, also known as the dorsal approach to the shaft of the radius, is one of the most widely used surgical techniques for addressing fractures of the proximal and middle third of the radial shaft.<sup>1</sup> This approach provides surgeons with direct access to the tensile surface of the radius, which is critical for stabilizing fractures and facilitating proper bone healing. The anatomical dissection plane for this approach lies between two muscles: The Extensor Digitorum Communis (EDC) and the Extensor Carpi Radialis Brevis (ECRB) muscles.<sup>2</sup> This dissection route ensures minimal disruption to major structures while allowing sufficient visibility and access to the fractured bone, which is essential in achieving a successful surgical outcome.<sup>3</sup>

Thompson's approach, however, comes with notable risks, particularly the risk of injury to the Posterior Interosseous Nerve (PIN).<sup>4</sup> This nerve, a terminal branch of the radial nerve, is responsible for innervating several extensor muscles in the forearm, making it highly susceptible to injury during surgical procedures, especially when operating on fractures located in the proximal third of the radius.<sup>5</sup> The proximity of the PIN to the operative field makes it vulnerable during dissection, posing a challenge for surgeons. Injury to this nerve can result in significant motor deficits, such as the inability to extend the fingers and thumb. Numerous studies have reported cases of PIN palsy following the use of Thompson's approach and the subsequent development of finger drop is a recognized complication. This complication is often associated with damage to multiple extensor muscles due to the PIN being affected.<sup>6</sup>

Most commonly, PIN palsy involves multiple fingers, leading to an inability to extend all or most of the fingers, resulting in what is commonly referred to as "finger drop." However, this case report describes a highly unusual presentation in which only the index finger was involved. In this rare case, the paralysis was isolated to the Extensor Indicis, the muscle that specifically controls the extension of the index finger. This muscle, which receives innervation solely from the PIN, is distinct from the muscles that control the other fingers, making this case both unique and rare in clinical presentations. Isolated paralysis of the extensor indicis due to PIN injury without involvement of other finger extensors is seldom reported in the literature.

This rare occurrence of isolated index finger drop can pose a diagnostic challenge, as it is not typically expected following the Thompson's approach, where more generalized extensor muscle dysfunction would be anticipated. The scarcity of such cases emphasizes the importance of detailed clinical evaluation, precise surgical techniques and intraoperative nerve monitoring to minimize the risk of nerve damage. It also highlights the need for surgeons to remain vigilant for atypical presentations of nerve injury in postoperative assessments.

The case presented in this report sheds light on this unusual and rare complication following the Thompson's approach and contributes to the broader understanding of potential nerve injuries associated with forearm surgeries. This report emphasizes the importance of recognizing that even isolated nerve injuries, such as paralysis of the extensor indicis, can occur and should be appropriately addressed to ensure optimal recovery for the patient.

**CASE PRESENTATION**

A 28-year-old male patient presented with chief complaint of pain and swelling left forearm following a fall after sustaining injuries in a road traffic accident. Patient is diagnosed of having a closed fracture of both bones forearm, involving proximal third and middle third junction of radius and middle third and distal third junction ulna. There was no neurovascular deficit. There is no evidence of any tendon injury.

After thorough preoperative evaluation and pre anesthetic checkup, patient was treated with open reduction and internal fixation of radius and ulna with 8 holed dynamic compression plate each under brachial block. The supinator muscle was subperiosteally elevated without isolating the nerve. Following the recovery from the block, patient had weakness of extension of index finger alone. There was no sensory loss. Patient was able to extend all other fingers at MCP joints. Motor power of wrist extension and flexion and flexion of interphalangeal joints of all fingers was normal. On POD-1 and 2 also the power of extension of index finger was grade 0. On POD-3, the patient had power of grade 2. On POD-10 at the time of suture removal, power was grade 3. He was treated with IV antibiotics till third post op day and later converted to oral antibiotics as the wound was healthy. The patient achieved full motor recovery at 3 months follow up (Figures 1 and 2).



**Figure 1. Post-operative X-ray.**



**Figure 2. Isolated Weakness of Extension of Index Finger.**

## DISCUSSION

Missancov AA et al., showed that the typical order of branching of the nerve was to Extensor Carpi Radialis Brevis (ECRB), supinator, Extensor Digitorum Communis (EDC), Extensor Carpi Ulnaris (ECU), Extensor Digiti Minimi (EDM), Abductor Pollicis Longus (APL), Extensor Pollicis Brevis (EPB), Extensor Pollicis Longus (EPL) and Extensor Indicis Proprius (EIP).

Spinner et al., explained that the proximal extensor digitorum communis muscle, that is, EDC fibres of the middle and ring fingers were supplied primarily by the recurrent nerve branch(es) and the extensor digitorum communis muscles of the index and little fingers by separate nerve branches.

According to Pei-Ji Wang et al., the branches for EIP originate from Posterior interosseous nerve at approximately 10 cm below the lateral epicondyle and cross the EPL and innervate the fibres of Extensor indicis muscle.

Injury to the isolated branches of EDC were reported earlier by Furnas et al., Spinner et al. and Rushnaiwala Faizan et al., as "sign of horns" following the fixation of proximal radius fractures under Thompson's approach. These studies showed involvement of EDC tendons of middle and ring fingers with sparing of extension of MCP joints of index and little fingers. In our case, there is loss of extension of index finger at MCP joint alone indicating paralysis of fibres of PIN supplying EDC to index finger and EIP.

Thus, it can be observed that, isolated paralysis of EDC to index finger or EIP can occur following compression of PIN distal to supinator. If the injury was proximal or at the level of supinator, the involvement of muscles could have been more extensive.

Even though the literature shows supinating the forearm to protect the PIN from injury and dissecting PIN at supinator muscle as methods to prevent PIN injury, it helps only in preventing injury to the proximal part of the nerve. It does not prevent the injury to the distal branches of the PIN.

Thus, in Thompson's approach, it is important to pay attention not only at supinator region, but it is better to be careful even while dissecting distally to avoid injury to the distal branches of PIN. It is better to avoid excessive ulnar sided retraction while using this approach to prevent compression of the distal branches of PIN. In order to avoid large incisions and dissection, usually, surgeons tend to retract the tissue to fix the last screws of the plate. During such scenarios, instead of using a Hohman's retractor, it is better to use Langenbach's retractor as far as possible. Nerve conduction studies could not be done in our case, as there was clinical recovery of the weakness within 3 weeks.

## CONCLUSION

The case presented demonstrates a rare complication following Open Reduction and Internal Fixation (ORIF) using Thompson's approach for a proximal and middle third radial fracture. Despite its popularity in orthopaedic surgery, this

approach carries the risk of injury to the Posterior Interosseous Nerve (PIN), which can result in motor deficits, most commonly affecting all the fingers. However, in this particular case, the injury was highly selective, affecting only the extensor function of the index finger through paralysis of the Extensor Indicis muscle (EIP). This isolated weakness emphasizes the variability in nerve injury presentations and the need for heightened intraoperative caution when using the Thompson's approach.

Key measures for reducing the risk of nerve damage include careful retraction techniques, minimizing tissue strain, and avoiding excessive ulnar-sided retraction, especially when dealing with the distal branches of the PIN. While supinating the forearm and dissecting the supinator muscle are helpful in protecting the proximal nerve, they do not fully prevent injury to the distal branches. Surgeons should be mindful of potential nerve compression during distal dissections and during the fixation of the plate.

This case also highlights the importance of close postoperative monitoring for any signs of nerve involvement, particularly in rare presentations of isolated finger weakness. Early detection and management of such complications can result in full motor recovery, as evidenced in this patient who achieved complete function within three months. The rare nature of isolated extensor indicis paralysis following Thompson's approach provides valuable insights into surgical technique refinement and postoperative care to improve outcomes in similar fracture management scenarios.

## REFERENCES

1. Furnas DW, Spinner M. The "sign of horns" in the diagnosis of injury or disease of the extensor digitorum communis of the hand. *Br J Plast Surg*. 1978;31(3):263-265.
2. Spinner RJ, Berger RA, Carmichael SW, et al. Isolated paralysis of the extensor digitorum communis associated with the posterior (Thompson) approach to the proximal radius. *J Hand Surg*. 1998;23(1):135-141.
3. Thompson JE. Anatomical methods of approach in operations on the long bones of the extremities. *Ann Surg*. 1918;68(3):309-316.
4. Missankov, Sehgal AK, Mennen U. Variations of the posterior interosseous nerve. *J Hand Surg Br*. 2000;3:281-282.
5. Rushnaiwala Faizaan, Hussain Naushad, Kulkarni Avadhut. The "Sign of Horns" deformity following the Thompson's approach to the proximal radius -A rare case report and literature review. *J Orthop Trauma*. 2019;26(1):29-33.
6. Wang PJ, Zhang Y, Zhao JJ, et al. Transfer of the extensor indicis proprius branch of posterior interosseous nerve to reconstruct ulnar nerve and median nerve injured proximally: An anatomical study. *Neural Regen Res*. 2017;12(1):143-148.