

## Case Report

# Tardy posterior interosseous nerve palsy associated with operated proximal shaft of radius fracture: a rare case report

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### ABSTRACT

Tardy Posterior interosseous nerve palsy (PIN) is rare diagnosis. It is a mostly motor nerve. It is prone to injury around radio-humeral joint due to its proximity to joint and neck of radius. Early diagnosis is must to improve recovery. In our case, 39-year-old male presented with tardy PIN palsy secondary to united proximal shaft radius fracture with implant in situ. Electrodiagnostic studies revealed motor radial neuropathy left upper limb. Magnetic resonance imaging (MRI) brachial plexus and screening of cervical spine was normal. After preoperative investigation, patient underwent PIN neurolysis with plate removal. Postoperatively patient started showing improvement after 2 months. Patient recovered to achieve good grip at end of 8 months. Early diagnosis followed by nerve exploration is necessary for good recovery and improvement.

**Keywords:** Radial nerve, Posterior interosseous nerve, Proximal radius fracture

### INTRODUCTION

Posterior Interosseous nerve (PIN) is a motor branch of radial nerve. PIN palsy is a rare diagnosis<sup>1</sup>. It can be acute or tardy. Acute presentation is fairly common.<sup>1,2</sup> Tardy PIN palsy can be traumatic or Non traumatic. Litcher and Jacobsen were first reported traumatic tardy PIN palsy which was associated with anterior Monteggia fracture.<sup>1</sup> Since then only four cases were reported in English literature.<sup>1</sup> I report a case of Tardy PIN palsy that developed after twenty years of open reduction and internal fixation of proximal radial shaft fracture left forearm.

### CASE REPORT

A 39-year-old male presented with chief complaint of weakness of extension of thumb and other fingers since 4 years. Weakness was progressive. First it was involving only fourth and little finger. Now weakness progress to all fingers. Patient had history of fracture proximal shaft of

radius left forearm, following which he underwent open reduction and internal fixation with six holed plate via Thompson approach.

On examination there was healed incision scar over dorsolateral aspect of left upper forearm (Figure 1). Elbow and wrist range of motion is within normal limit. Neurological examination revealed grade 1 weakness of extensor digitorum corporis, extensor pollicis longus, extensor digiti minimus, and extensor indicis. There was no sensory deficit. Passive joint range of motion of fingers and thumb was normal. Grip weakness was present.

Magnetic resonance imaging (MRI) of brachial plexus was revealed no abnormal signal intensity along roots, neural foramina, and its divisions. MRI screening of cervical spine (C spine) revealed age related disc desiccation along C spine discs.

Electrodiagnostic studies were done. Motor nerve conduction study (NCV) of extensor indicis (EI) was done

which was showing low amplitude from elbow to EI. Sensory NCV of anatomical snuff box was normal. It revealed left motor radial nerve palsy. X-ray of left forearm was done. Fracture was united with plate in situ.

After preoperative evaluation, patient underwent open exploration of radial nerve and implant removal under general anesthesia. Anterolateral elbow approach was done (Figure 1). Radial nerve was traced between brachioradialis and brachialis (Figure 2). It was further traced till its tributaries. Intraoperatively, superficial radial nerve found to be intact (Figure 3). PIN found to be adhering to plate and enclosed in fibrotic band in-between muscle fibers of supinator muscle [known as Arcade of Frohse] (Figure 3).

Neurolysis was done. Plate was removed. Normal muscle was sutured between radius and PIN nerve to avoid future chances of adhesion formation. Elbow movement was done to check free movement of nerve. Wound was closed in layers. Elbow range of motion started on 48 hours after procedure.

I followed patient regularly. Neurological examination was done after 2 months. Thumb extension and finger extension was grade 3. Sequential physiotherapy was started. At end of 8 months, finger and thumb extension was grade 4. Grip strength improved.



**Figure 1: Incision centred over elbow joint antero-lateral approach; distal (left), proximal (right).**



**Figure 2: Intermuscular plane between brachioradialis laterally and biceps, brachialis medially. Distal (left), Proximal (right).**



**Figure 3: Intra-operative image of explored radial nerve and its branches. Orange arrow is distal part of radial nerve which is dividing just proximal to radial head. Blue arrow is superficial radial nerve. Black arrow is PIN branch which curls around upper part of plate with fibrotic band.**

**Table 1: Literature of old case reports of tardy pin palsy.**

Authors	Age (years)	Age at time of injury (years)	Interval (years)	Duration of symptoms	Treatment	Recovery period
Cho et al <sup>2</sup>	46	6	40	1 month	Neurolysis and Radial head excision	8 months
Daurka et al <sup>1</sup>	55	55	36	24 hours	Neurolysis and Radial Head excision	6 weeks
Austin et al <sup>3</sup>	72	7	65	1 month	Neurolysis and Radial Head Excision	9 months

## DISCUSSION

PIN extends from radio-humeral joint to wrist joint.<sup>1-3</sup> It has mostly motor supply to all extensor muscle of forearm and hand except extensor carpi radialis longus, brachioradialis.

There are various traumatic and non-traumatic causes reported in past literature.<sup>4</sup> Traumatic causes are Monteggia fracture-dislocation, its variants, and other fractures around elbow.<sup>2-4</sup> Non-traumatic causes are entrapment syndrome due to generalized like rheumatoid arthritis, hypothyroidism.<sup>5</sup> Nontraumatic localized causes are septic arthritis, ganglion, and lipoma.<sup>6-8</sup>

PIN lies in vicinity of radio-humeral joint.<sup>4</sup> It also winds around neck of radius. According to Tornetta et al., PIN lies  $1.2 \pm 1.9$  mm from radio-humeral joint. It is mostly proximal (62%) than distal (48%) to joint. It is mostly intramuscular found in substance of supinator.<sup>4</sup> In our case, PIN was 2 mm from joint capsule intraoperatively (Figure 3).

In our case, PIN found to be adhering to upper part of plate via fibrotic band which had led to decrease excursion of nerve. Repetitive elbow joint movement and decreases excursion of nerve may have led to palsy. Another reason was formation of fibrotic band around nerve. I suggest following things while managing proximal radius shaft fracture operatively.

Explore PIN first before fixing fracture to avoid nerve injury. Keep healthy tissue in-between nerve, bone and implant to avoid adhesions.

In literature, it was found that main treatment of tardy PIN palsy is neurolysis and management of underlying cause of palsy (table 1).<sup>1-3</sup> Like in Monteggia fracture dislocation, dislocated radial head is excised to avoid further damage to nerve (table 1).<sup>1,2</sup> Early diagnosis and management of tardy PIN palsy will improve prognosis of recovery.

## CONCLUSION

PIN lies near to the neck of radius. Its dissection is important while handling fracture around it. Patient needs

to be prognosticated regarding late involvement of PIN palsy for early diagnosis and management. Good prognosis depends on early diagnosis. Mainstay of treatment is neurolysis and removal of underlying cause of palsy.

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