

Posterior Interosseous Nerve Palsy Induced by Ganglion Cyst: A Case Report

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Abstract

Posterior interosseous nerve (PIN) palsy is a rare condition that causes motor deficits without sensory loss, often due to trauma, compression, or inflammation. One possible cause is compression by a ganglion cyst, a benign lesion often arising from tendon sheaths or joint capsules, particularly near the elbow's arcade of Frohse. This report describes the rare diagnosis and treatment of a PIN palsy secondary to a ganglion cyst in an 81-year-old man. Electromyography (EMG) confirmed PIN dysfunction, and imaging identified a 13mm ganglion cyst at the arcade of Frohse compressing the nerve. Surgical decompression and cyst excision resulted in progressive motor recovery, with complete resolution of symptoms by six months. This case highlights the importance of considering ganglion cysts in cases of non-traumatic PIN palsy. Early recognition and surgical intervention can facilitate full neurologic recovery.

Keywords: EMG, Ultrasonographic Diagnosis, Isolated Nerve Palsy, Posterior Interosseous Nerve, Ganglion Cysts

Introduction

Posterior Interosseous Nerve (PIN) palsy is a rare, yet clinically significant condition caused by traumatic injuries, compressive lesions, and inflammatory processes. PIN palsy can emerge because of compression by a ganglion cyst, a benign soft tissue lesion typically originating from tendon sheaths and joint capsules in the elbow region near the arcade of Frohse.

Ganglion cysts are frequently encountered in orthopedic practices and are typically located the dorsal wrist near the scapholunate ligament or in the volar wrist at the radiocarpal or triscaphoid joint [1]. However, when ganglion cysts arise from the elbow joint, given the proximity of neurovascular structures, neurologic symptoms may arise.

PIN palsy, characterized by weakness in finger and thumb extension, usually spares wrist extension due to the innervation of extensor carpi radialis longus by the proper radial nerve [2]. Importantly, patients with PIN palsy should maintain normal sensation upon physical exam due to the lack of cutaneous innervation by PIN.

Accurately diagnosing PIN palsy secondary to a ganglion cyst necessitates a thorough clinical assessment supplemented by image modalities such as magnetic resonance imaging (MRI) or ultrasound.

Case Presentation

An 81-year-old gentleman presented to the hand surgery clinic reporting a sudden onset of weakness in his right hand's ability to extend his middle, ring, and small fingers, with the index and thumb also affected to a lesser extent. There was no history of trauma; the symptoms began following a session of push-ups 4 weeks prior.

The patient exhibited no altered sensation in any peripheral nerve distributions distally. Muscle strength testing revealed a rating of 3/5 strength for the Extensor Indicis Proprius (EIP) and extensor pollicis longus (EPL), while the Extensor Digitorum Communis (EDC) showed 0/5 strength in the middle, ring, and small fingers. Notably, radial deviation of the right wrist was observed with wrist extension. Additionally, tenodesis testing was normal and the suspicion for attritional extensor tendon rupture was low.

Given the clinical presentation, posterior interosseous nerve (PIN) palsy was the primary consideration. The electromyography (EMG) results indicated a conduction block as well as axon motor loss in the radial nerve at the elbow, suggestive of right PIN neuropathy. The superficial radial nerve appeared to be spared. Notably, a cystic mass adjacent to the lateral epicondyle, in proximity to the PIN, was visualized during examination (Figure 1).

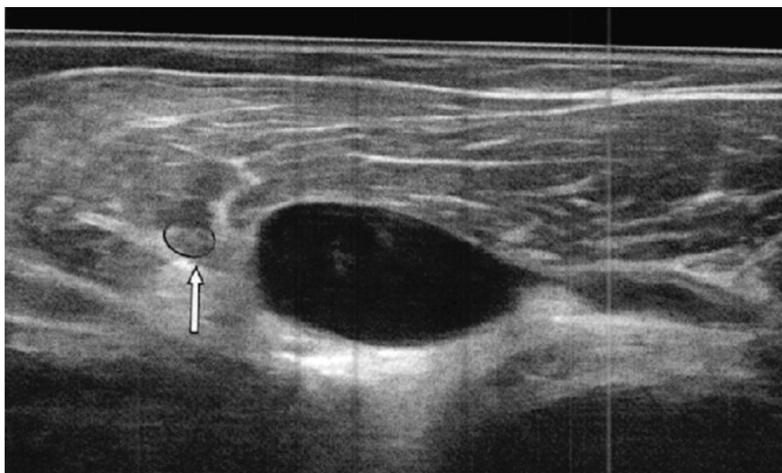


Figure 1. Ultrasound imaging of a long axis view distal to the lateral epicondyle showing a cystic mass; PIN (white arrow) in close proximity.

Magnetic resonance imaging (MRI) imaging revealed a hyperintense lesion at the Arcade of Frohse, likely contributing to the compression of the PIN. The mass, measuring 13mm, exhibited characteristics consistent with a ganglion cyst (Figure 2).

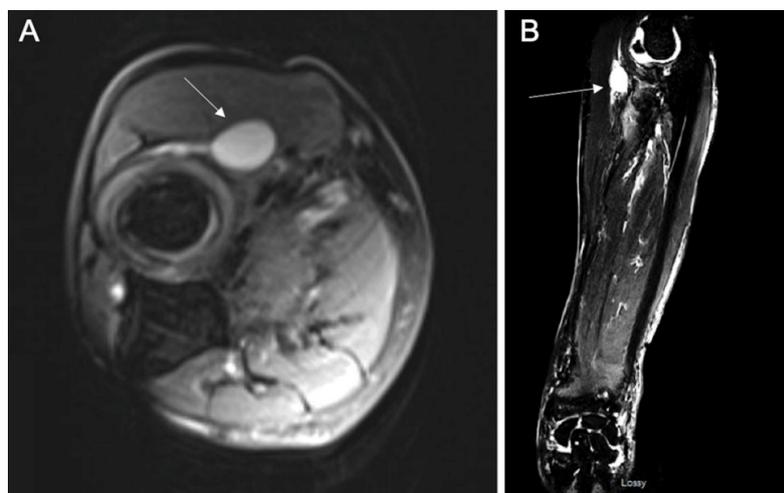


Figure 2. MRI images showing a hyperintense lesion at the Arcade of Frohse measuring 13mm (see arrows)

A- Axial view, B- Coronal view

Approximately three weeks following the initial clinic visit, the patient underwent exploration of the PIN and mass excision in the operating room. Intraoperatively, the PIN was found compressed by a ganglion cyst originating deep as it entered the Arcade of Frohse. Clinical photos captured during the procedure depicted the cyst (Figure 3), measuring 1 x 1.5cm, emerging from the radiocapitellar joint. The Arcade of Frohse was released, and the ganglion cyst was subsequently decompressed, transected at its base, and sent for pathology examination. Additionally, a small arthrotomy revealed an abundance of synovial fluid and fibrinous debris consistent with arthritis.

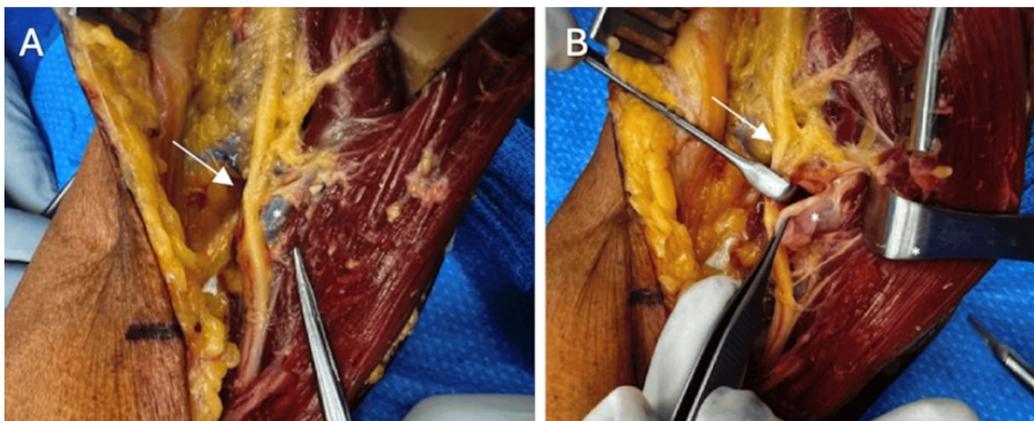


Figure 3. Clinical photos showing a ganglion cyst (white asterisk) compressing the PIN (white arrow) posteriorly as it enters the Arcade of Frohse.

A- Showing the relationship of the PIN (white arrow) to the ganglion cyst (white asterisk),
B- Showing retraction of the PIN and pickups grasping the decompressed ganglion cyst.

The pathology report confirmed the diagnosis of a benign ganglion cyst. A repeat EMG/nerve conduction study (NCS) performed at six weeks postoperatively demonstrated reinnervation changes of the muscles innervated by the PIN. Subsequent clinic follow-ups at two weeks, eight weeks, and six months postoperatively documented consistent improvement in nerve palsy symptoms. At the six-month mark, complete resolution of the PIN nerve palsy was observed, with examination revealing 5/5 wrist extension, no radial deviation, and 5/5 strength of digit extension and EPL strength.

Discussion

PIN palsy is a rare condition, with an estimated annual incidence rate of 0.03%. Among non-traumatic causes of compressive PIN palsy, soft tissue, or bony growths, typically intramuscular masses are most common [3]. Compression of the PIN can occur at various sites, including the lateral elbow joint, leash of Henry, fibrous edge of extensor carpi radialis brevis, arcade of Frohse, or distal edge of the radial tunnel, with the arcade of Frohse being the most common site of compression [4].

Literature referencing nerve compression due to ganglion cysts at the elbow is sparse. One of the earliest documented case dates to 1966 when Bowen and Stone reported a patient with PIN compression in the supinator muscle, resulting in wrist extensor weakness. Following excision of the ganglion cyst, the patient's symptoms were alleviated [5].

In 2007, Yamazaki et al. presented a series of 14 cases where ganglion cysts caused radial nerve palsy at the elbow. Using ultrasound, computed tomography (CT), and MRI, they classified the ganglions into two types: type A, proximal to the supinator or arcade of Frohse, and type B, distally. According to the authors, type A ganglion cysts displaced the radial nerve anteriorly, leading to PIN palsy, while the superficial radial nerve remained unaffected due to its path [6].

In contrast, Miralles et al. in 2016 reported seven patients with type A ganglion cysts associated with sensory alterations in the distribution of the superficial radial nerve but no motor deficits [7]. Matsubara et al. described eight cases of radial nerve palsy, primarily due to ganglion compression, with all patients experiencing PIN compression symptoms and one also having superficial radial nerve compression [8].

Other documented cases include McFarlane et al., who described a patient with a ganglion cyst causing compression of the superficial radial nerve and sensory symptoms without motor deficits [9], and Purohit et al., who reported a case like ours, presenting with atraumatic PIN palsy. Following surgical excision of the ganglion, the patient fully recovered motor function within a year [10].

Conclusion

The rarity of ganglion cysts in the elbow region underscores the potential for misdiagnosis or delayed diagnosis, which can lead to cases taking months to years to be correctly identified and treated. This case further reinforces complete recovery and reinnervation is achievable following relief PIN compression through surgical excision. Clinicians should therefore consider ganglion cysts in cases of non-traumatic PIN palsy to facilitate prompt identification and treatment.

Conflicts of Interest

The authors declare no conflicts of interest.

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