



Posterior interosseous nerve palsy due to lipoma: A rare case report

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Abstract

The posterior interosseous nerve is the terminal motor branch of the radial nerve without a sensory component. The nerve may be compressed for various reasons along the course of the forearm. Two different clinical pictures occur due to compression of the nerve in the forearm. In radial tunnel syndrome, entrapment of the nerve in the radial tunnel, pain in the elbow is at the forefront, while in the second clinical picture, posterior interosseous nerve syndrome, wrist and finger extension are affected. Posterior interosseous nerve syndrome is rare and develops due to many causes such as trauma, previous surgeries around the elbow, neurologic diseases and abnormal anatomical structures. A rare condition in the etiology of posterior interosseous nerve syndrome is mass lesions causing compression of the forearm.

Keywords: Posterior interosseous nerve, lipoma, neuropathy

Introduction

The radial nerve originates from the C5-T1 roots and exits from the posterior cord of the brachial plexus. The terminal branch of the nerve is the posterior interosseous nerve (PIN), which has pure motor function and no sensory component [1]. This nerve passes through or under the supinator muscle in the forearm and innervates the supinator muscle first. Then, PIN gives motor branches to the extensor carpi communis, extensor carpi ulnaris and extensor digiti minimi muscles along its course and may be compressed for various reasons during its course.

Entrapment neuropathies due to compression of the PIN are less common than neuropathies due to compression of the median and ulnar nerves, with an annual incidence of approximately 0.03% [2]. The entrapment of the PIS in the forearm according

to its course causes two different clinical pictures. The more common of these is radial tunnel syndrome, which occurs due to compression of the radial nerve in the radial tunnel at the elbow [3]. The second clinical picture is compression of the PIN distal to the radial tunnel and is called posterior interosseous nerve syndrome (PINS). The clinical presentation of PINS is characterized by motor deficits. Gradual or sudden loss of strength is seen in hand-wrist and finger extension. Pain can be seen in the initial stages and there is no loss of sensation. Although there is no complete loss of wrist extension but wrist deviates radially during extension [4]. Clinical features of radial tunnels syndrome is pain and fatigue over the lateral epicondyle of the elbow and proximal forearm, increasing at night. There is no motor deficit. A relationship between PIN compression and pain has been established and this condition has been termed

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resistant tennis elbow [5].

Pathologies that cause radial nerve compression have been previously described and the most common compression point is the level of the frohse arc formed by the proximal part of the supinator muscle distal to the radial tunnel. In addition, PIN may be compressed due to radiocapitellar joint arthrosis and fibrous bands, radial recurrent veins and fibrous band of extensor carpi radialis brevis. In addition to these conditions that cause PIN compression, PIN palsy may be seen after trauma and fractures such as monteggia, especially around the elbow, secondary to systemic diseases such as diabetes mellitus and rheumatoid arthritis or more rarely in association with motor neuron diseases such as multifocal motor neuropathy, hereditary brachial plexopathy and monomelic amyotrophy. Another cause of PINS is lesions such as ganglion cysts, hemangioma, lipoma, synovium in the forearm that cause nerve compression [6].

In this study, we diagnosed PINS in a patient who had no physical examination findings such as palpable swelling on palpation of the forearm and extensor motor deficit, magnetic resonance imaging (MRI) and electromyography (EMG) revealed a lipoma in the forearm. We aimed to present this rare case which we treated surgically.

Case Report

A 58-year-old woman presented to our outpatient clinic with numbness in the first three fingers of the right hand and intermittent pain in the proximal forearm. Her complaints had been ongoing for 1 year. The patient had a history of diabetes mellitus and no other comorbidities. The patient had occasional numbness of the fingers during the daytime, more severe at night and a history of waking up at night shaking his hand. On physical examination, tinnel and phalen test were positive in the median nerve. No pain in the forearm was detected by palpation and there was no palpable swelling. EMG was ordered and findings compatible with mild to moderate carpal tunnel were found. The patient was diagnosed with carpal tunnel and initially treated conservatively. After wrist splinting and non-steroidal anti-inflammatory treatment, the patient's complaints did not improve and surgery was performed. In the outpatient follow-up, it was learned that the complaints of numbness disappeared at night, but extension weakness was observed in the 2nd and 3rd fingers. Sensory examination revealed no pathology. When loss of extension in the 2nd and 3rd fingers developed during follow-up, radial nerve entrapment at the forearm or elbow level was suspected and MRI imaging was requested. On MRI imaging, it was interpreted that there was a 4x2.3x5.7 cm solid space-occupying lesion compatible with lipoma in the anterior neighborhood of the radius bone between the brachioradial muscle and supinator muscle groups and there was a radial nerve extending between the lipoma and the brachioradialis muscle (Figure 1). Surgery was planned for the patient who was diagnosed with PINS and she was taken to surgery after preop preparations.

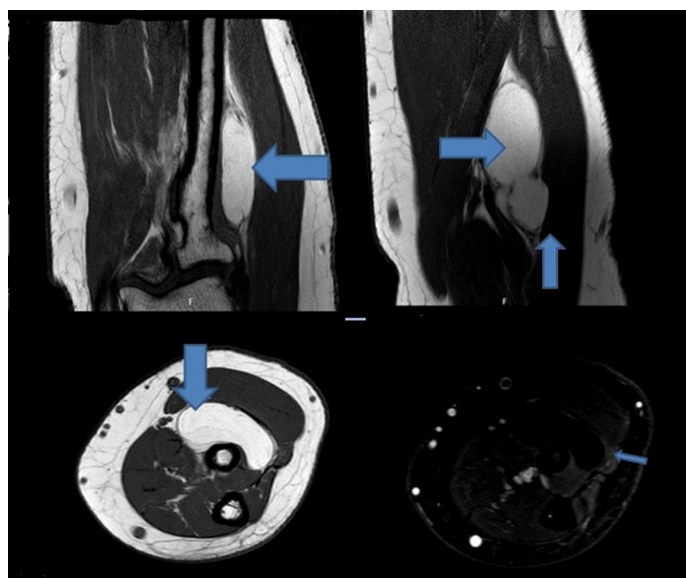


Figure 1. Magnetic resonance images of the mass in the forearm (Blue arrows)

Under axillary block anesthesia, with the patient in supine position, after tourniquet application to the proximal forearm, the skin subcutaneous fascia was crossed through the posterolateral incision of the elbow in the forearm full pronation position. The brachioradial muscle was crossed with split blunt dissection and the radial nerve was reached. It was followed distally and frohse arc was reached proximal to the supinator muscle. The arcuate artery was ligated and cut and the supinator muscle was cut distally and the radial nerve was preserved and freed. The mass, which stretched the nerve by forcing it anteriorly, was appropriately freed and removed (Figure 2-3-4). Surgery was terminated by placing a drain after bleeding control. The biopsy material was reported as intramuscular lipoma. After surgery, a dynamic wrist splint was applied on the third postoperative day. Active wrist and finger extension was started three weeks later. The patient regained full muscle strength at 6 months (Figure 5). In 2 years follow-up patient had no complaint.

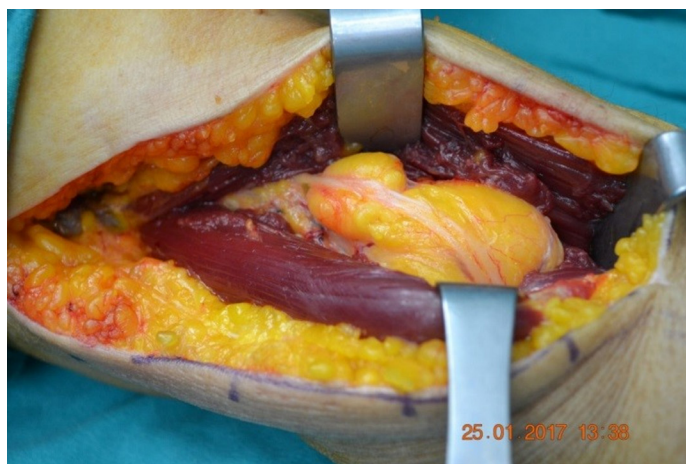


Figure 2. Intraoperative image of the posterior interosseous nerve under compression due to the mass



Figure 3. Posterior interosseous nerve appearance after removal of the mass



Figure 4. Excised mass (lipoma)



Figure 5: The picture showing that our patient has no motor deficit at 6 months postop

Discussion

PINS is a clinical picture caused by entrapment of the deep branch of the radial nerve distal to the elbow joint. In this picture, paralysis and paresthesia develop in the finger extensors. Clinically, it

differs from radial tunnel syndrome in that the entrapment is distal and there is pure motor involvement. Therefore, low hand development is not seen, but radial deviation in wrist extension is seen due to involvement of the extensor carpi ulnaris muscle [7]. There is no sensory component except for pain with compression at the site of entrapment. The pain characteristically occurs intermittently with supination and pronation due to compressive bands at the elbow level. In our case, there was no sensory deficit in the radial nerve dermatome and forearm. Our patient had a history of intermittent pain in the proximal forearm and loss of extension of the 2nd and 3rd finger, which developed over time, was the main complaint.

Radial nerve entrapment develops less frequently than other upper extremity compression neuropathies with an annual incidence of 0.03% [2]. The most common site of compression of the PIN is the frohse arc, which is seen as a fibrotendinous band in the proximal forearm. Bilateral involvement in PIN entrapment is rare and patients may have shoulder instability, trigger finger, carpal tunnel syndrome and a history of previous surgery around the elbow [8]. In our case, the involvement was unilateral. He was previously followed up for carpal tunnel syndrome. The etiologic cause in our patient was a mass lesion causing compression and surgical treatment was performed for the lesion. In our case, the involvement was unilateral. Our patient was previously followed up for carpal tunnel syndrome. In our patient, the etiologic cause was a mass lesion causing compression and surgical treatment was performed for the lesion. However, conditions that may cause intraoperative PINS, such as a possible frohse's arch compression, were taken into consideration and evaluated at surgery.

There are many etiologic reasons for the development of PINS. Traumas are seen especially after fractures and dislocations of the radius bone. A case of PINS due to Monteggia fracture has been reported in the literature [9]. PINS syndrome may be idiopathic or may develop after repetitive trauma to the forearm, and a study showing spontaneous radial nerve palsy after edema in the forearm has been reported [10]. Another rare cause of PINS syndrome is the presence of a space-occupying lesion causing compression of the forearm. Synovial cysts, hemangiomas, lipomas, ganglion cysts may cause compression of the forearm and this rare condition has been reported in the literature with case reports [11,12]. In our case, we demonstrated that a deep-seated lipoma, which did not present as a palpable swelling on physical examination, is a rare cause of PINS.

Clinical examination and patient history are very important for the diagnosis of PINS and the diagnosis is confirmed by EMG. In EMG examination, the brachioradialis, extensor carpi radialis longus and brevis muscles innervated by the radial nerve are preserved because of distal involvement and EMG should be normal because there is no sensory component. In contrast, activity is expected in the extensor digitorum communis and extensor indicis proprius muscles [13]. In the presence of clinical

suspicion for space-occupying lesions in the forearm, magnetic resonance imaging is also helpful in making the diagnosis [14]. EMG was completely normal in our patient. The reason for this is that the EMG performed in our patient due to carpal tunnel was performed before the development of PINS. There was no motor deficit when EMG was performed and the patient had no complaints except occasional proximal forearm pain. After the development of pain and motor deficit in the forearm, we considered PINS syndrome and clarified the etiology of our diagnosis with MRI to reveal a mass space-occupying lesion, which is a rare cause.

If there is no space-occupying lesion on imaging studies in patients with PINS, conservative treatment should be tried and anti-inflammatory drugs, splinting and physical therapy are applied. If there is no functional improvement or worsening in 6-month follow-up, surgery is performed. In the presence of a mass lesion that will cause nerve palsy, surgical treatment should be prioritized over conservative treatment because rapid diagnosis and early removal of the mass facilitates neurological recovery [15]. In our case, we performed a surgical procedure for the deep-seated mass lesion causing PINS and in accordance with the literature, we observed that our patient's extension deficit and muscle strength completely recovered in the follow-up.

Conclusion

In conclusion, PINS is less common than other upper extremity neuropathies and its management depends on the etiology. Clinical examination and electrodiagnostic studies are very important in the diagnosis, but rare space-occupying lesions in the forearm should be kept in mind in the etiology and should be suspected because they may not give clinical findings secondary to the possibility of deep localization. MR imaging is very important in the diagnosis of these surgically treated lesions.

Conflict of interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical approval

Does not require ethics committee approval.

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