Article published online: 2022-12-16

A Rare Cause of Posterior Interosseous Nerve Syndrome: Intraneural Lipoma

Una causa rara del síndrome del nervio interóseo posterior: Lipoma intraneural

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Rev Iberam Cir Mano 2022;50(2):e146–e150.

Abstract

Posterior interosseous nerve (PIN) syndrome is a condition defined by compressive neuropathy of this radial nerve branch caused by trauma, space-occupying lesions, brachial neuritis, or spontaneous compression. Its clinical presentation is characterized by an insidious onset of symptoms, usually a deficit in finger extension without sensitive impairment. In the present article, we report a clinical case of a 72-year-old female with an intraneural lipoma that had been causing extrinsic compression for 11 months, and had a full recovery after surgical excision. Besides the paucity of clinical cases described in the literature (only three to date) we also emphasize the excellent outcome of the patient, regardless of her age and of the duration of symptoms.

Keywords
- PIN
- posterior interosseous nerve syndrome
- intraneural lipoma
- lipoma

Resumen

El síndrome del nervio interóseo posterior (NIP) es una condición definida por la neuropatía por compresión de esta rama del nervio radial causada por traumatismos, lesiones ocupantes de espacio, neuritis braquial, o compresión espontánea. Su presentación clínica se caracteriza por un inicio insidioso de los síntomas, generalmente un déficit en la extensión de los dedos sin alteración sensitiva. En este artículo, presentamos un caso clínico de una mujer de 72 años con un lipoma intraneural que causó compresión extrínseca por 11 meses y tuvo una recuperación completa después de la extirpación quirúrgica. Además de la escasez de casos clínicos descritos en la literatura (solo tres hasta la fecha), también destacamos la excelente evolución de la paciente, independientemente de su edad y de la duración de los síntomas.

Palabras clave
- NIP
- síndrome del nervio interóseo posterior
- lipoma intraneural
- lipoma

Introduction

The upper extremity is a common site of compressive neuropathies. Comprehensive knowledge of its anatomy and the relationship of each nerve with different muscles and vascular structures is vital to accurately diagnose the specific nerve and compression site involved. Although less common than carpal tunnel syndrome, posterior interosseous nerve (PIN) syndrome is a condition that requires special attention, as it may lead to misdiagnosis if not correctly considered.[1]

received
April 23, 2020
accepted
June 14, 2022

DOI https://doi.org/10.1055/s-0042-1755314.
ISSN 1698-8396.

Thieme Revinter Publicações Ltda., Rua do Matoso 170, Rio de Janeiro, RJ, CEP 20270-135, Brazil

The radial nerve arises from the C5-T1 nerve roots and comes off the posterior cord of the brachial plexus. It travels down the arm and divides into superficial and deep branches in the proximal forearm. In most cases, the deep branch dives into the posterior compartment between the supinator heads and emerges as the PIN. Some anatomical variants are described, mainly involving the arcade of Frohse, and increased susceptibility to impingement may be observed. The PIN innervates the extensor muscles of the forearm, except for the extensor carpi radialis.[2]

Compressive neuropathies affecting the radial nerve distal to the elbow include radial tunnel syndrome (RTS), PIN syndrome, and Wartenberg syndrome. Each of these conditions has distinct symptoms that can help to establish the correct diagnosis.[1]

Posterior interosseous nerve syndrome is characterized by an insidious onset, often presenting with a variable deficit in wrist and finger extension and with some degree of radial deviation. However, because the extensor carpi radialis longus is innervated by the radial nerve, wrist extension is frequently unaffected.[3] Most of the times, it is self-limiting and treated conservatively. However, when symptoms are refractory to the nonoperative treatment, surgical decompression is usually required.[4]

The causes of PIN syndrome may be trauma, space-occupying lesions, brachial neuritis, and spontaneous compression.[3] The most common site of compression is at the arcade of Frohse (the proximal edge of the supinator). Repetitive pronation/supination activities can also cause these symptoms.[5]

Unlike carpal tunnel syndrome, PIN syndrome more often affects males than females, in a 2 to 1 ratio. It also occurs about twice as often in the right limb.[5] There is sometimes a painless presentation of PIN syndrome that may lead to misdiagnosis, most frequently with radial tunnel syndrome and tendon rupture, especially when the neurological findings are incomplete (since there is a sensitive functional impairment in RTS).

The prognosis is particularly good (for both neuropraxis and axonotmesis) in space-occupying lesions, with a good chance of complete recovery if the onset of symptoms does not exceed 12 weeks.[6]

Case Report

A 72-year-old woman with type-2 diabetes mellitus and arterial hypertension was referred to our department after being unable to extend the fingers of her right hand for 11 months. The development of symptoms was progressive and simultaneous with the appearance of a subcutaneous volar radial mass on her forearm.

Upon physical examination, there was a deficit in the extension of the fingers and a painless, mobile, soft, and regular subcutaneous tumor. There was no radial or ulnar deviation, nor sensory deficits. The wrist extension strength was mantained (score of 4/5 on the Medical Research Council Scale for Muscle Strength) (►**Figs. 1-4**).

The ultrasound study showed an hyperechogenic mass with hypoechogenic signal, and the MRI showed homogeneous hyperintensity both in T1- and T2-weighted scans.

We chose a modified posterolateral approach with an S-shape incision. Intraoperatively, we could easily identify the PIN, and an intraneural lipoma wrapped around the nerve fibers was identified and totally excised, without major damage to the nerve (►**Figs. 5–7**). The anatomopathological examination revealed hyperplasia of the adipocytes with

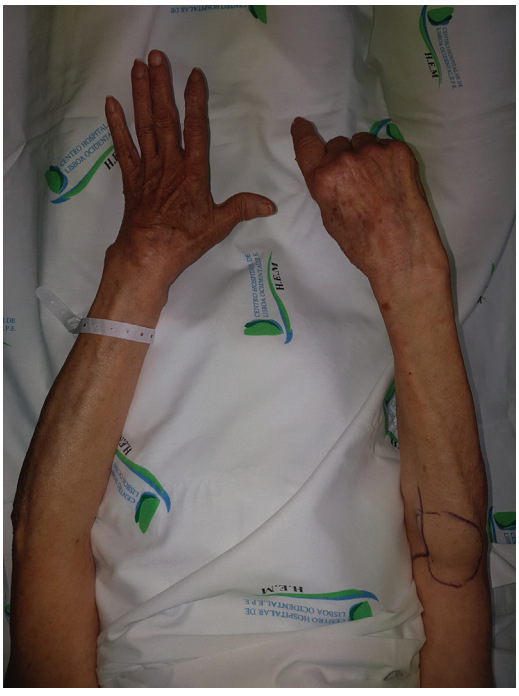

Fig. 1 Preoperative dorsal view.

Fig. 2 Preoperative volar view.

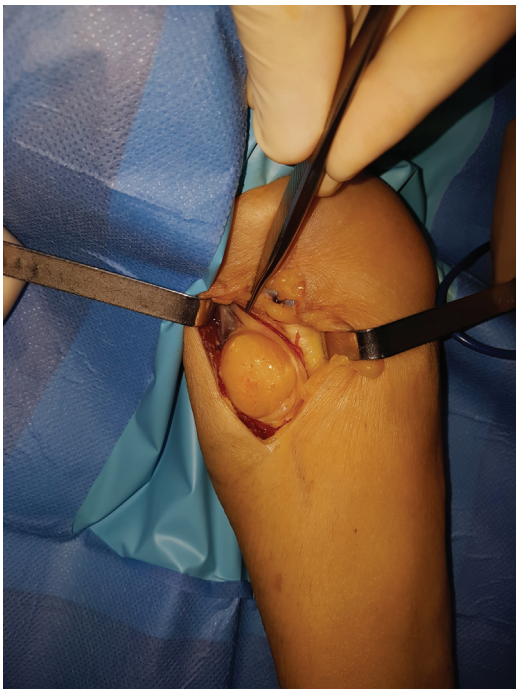

Fig. 3 Preoperative extension.

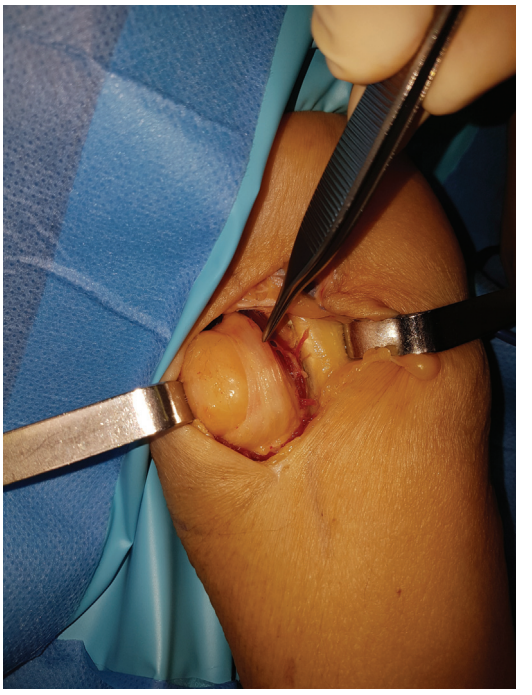

Fig. 4 Preoperative extension.

some fibrous tissue, confirming our clinical diagnosis of lipoma.

After 3 months of rehabilitation, full recovery was achieved with complete extension of the fingers and strength against resistance mantained (score of 5/5 on the Medical Research Council Scale for Muscle Strength) (►**Figs. 8-11** and ►**Video 1**).

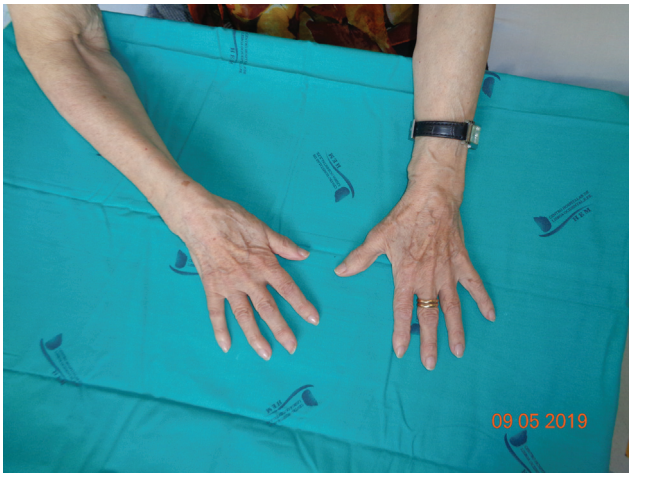

Fig. 6 Intraoperative intraneural PIN lipoma.

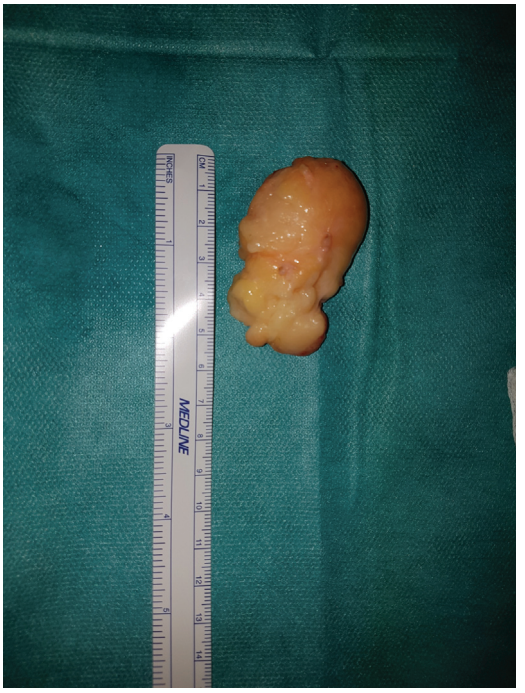

Fig. 5 Intraoperative intraneural PIN lipoma.

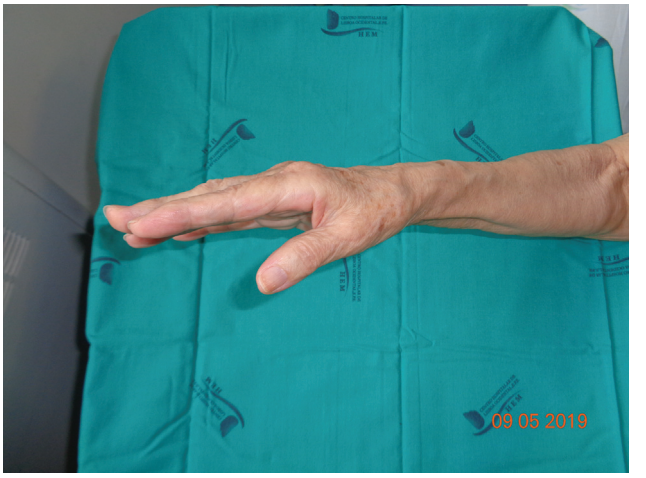

Fig. 7 Lipoma.

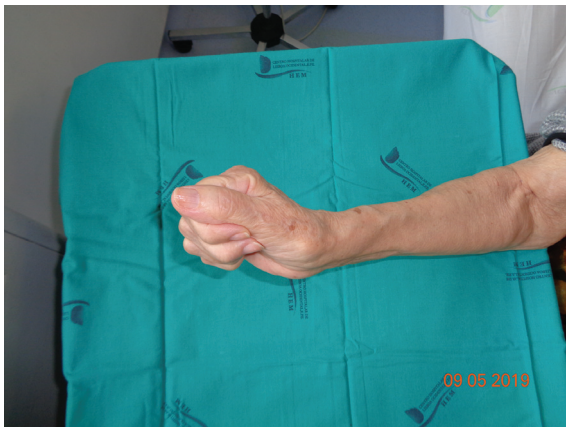

Fig. 8 Postoperative flexion.

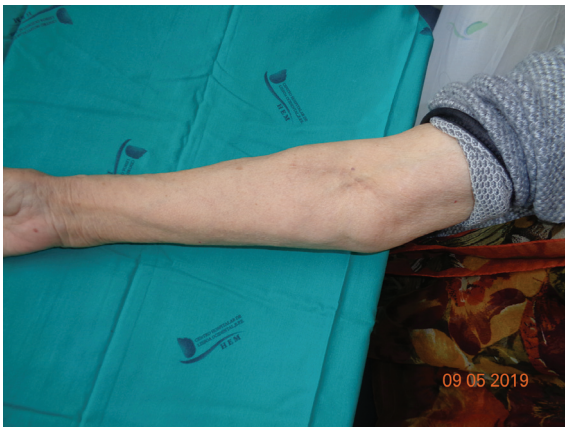

Fig. 9 Postoperative extension.

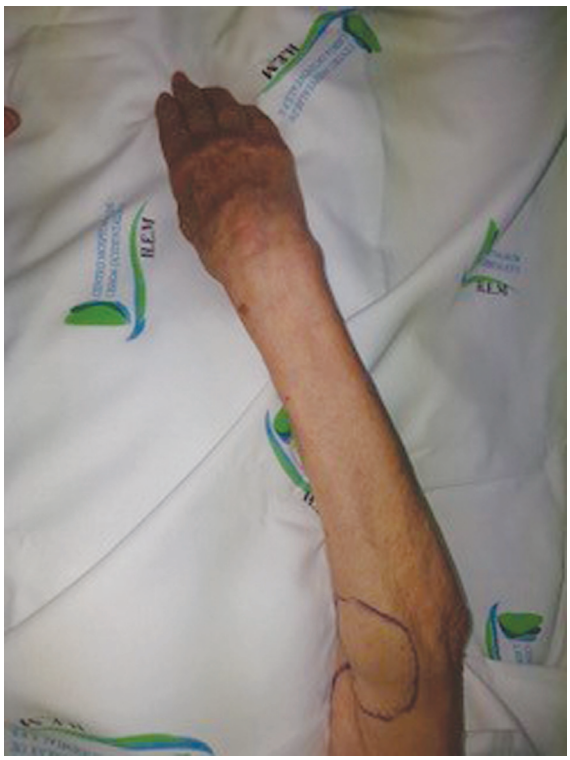

Fig. 10 Postoperative scar.

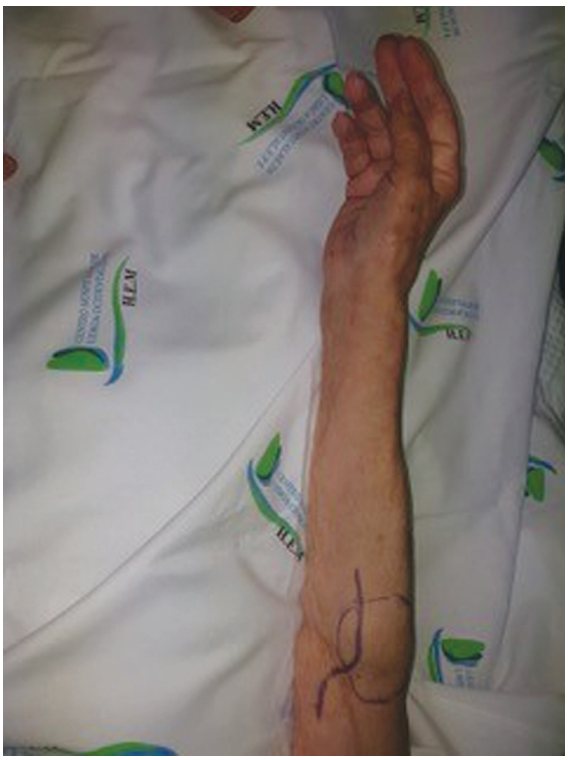

Fig. 11 Postoperative comparison with the left hand.

Video 1

Postoperative recovery. Online content including video sequences viewable at: https://www.thieme-connect.com/products/ejournals/html/10.1055/s-0042-1755314.

Discussion

The differential diagnosis for PIN syndrome includes RTS, Wartenberg syndrome and even tendon ruptures. The clinical history and physical examination are vital to establish a diagnosis. Both RTS and Wartenberg syndrome may involve the same sites of compression as those of PIN syndrome; however, they present with forearm pain without motor weakness. Tendon ruptures usually have a more abrupt presentation, with functional deficit since day one, and may be caused by trauma or by fractures (either acute or sub-acute).

Extrinsic or intrinsic compression can cause PIN syndrome. Extrinsic compression is an uncommon condition that requires early diagnosis and prompt surgical treatment. Lipomas of the peripheral nerve are benign tumors with a slow-growing pattern that are composed of white fat cells. They are usually extraneural, causing a slow onset of symptoms, and can be either intramuscular, intermuscular or paraosseous. Intraneural lipomas are very uncommon;

Table 1 Literature on posterior interosseous nerve syndrome caused by intraneural lipoma

Year	Author	Age (years)	Gender	Symptoms*	Type of lipoma	Pathology	Treatment	Evolution
2019	Nogueira et al. (present study)	72	Female	0/5ª of finger extension	Intraneural	Nervous fibers adherent to the capsule	Total ressection	5/5ª of extension
2018	Patel et al.[7]	66	Male	0/5ª of finger extension	Intraneural	Nervous fibers adherent to the capsule	Total ressection	4/5ª of extension
2016	Yamamoto et al.[8]	60	Female	Assymptomatic	Not specified	Nervous fibers in the adipose tissue	Subtotal ressection	5/5ª of extension
2007	Matsuo et al.[9]	60	Male	Dorsal hand paresthesia and 3/5ª of finger extension	Intraneural	Nervous fibers in the adipose tissue	Total ressection with sacrifice of the posterior interosseous nerve and tendinous reconstruction	4/5ª of extension

Note: *Score on the Medical Research Council Scale for Muscle Strength.

only three clinical cases[7–9] have been described in the literature, and it may be misdiagnosed with fibrolipomatous hamartomas of the nerve or other similar conditions. However, these clinical entities present differently, with intraneural lipomas having a well-defined capsule and hamartomas consisting of fibrous and fatty tissue containing nerve fibers.

The best surgical approach must be tailored to each patient as it depends on the anatomical relationship of the tumor with the neurovascular structures. The most common surgical approaches are the posterolateral and anterior. Although the posterolateral approach requires lower levels of dissection, it may be more challenging since the tumors may hinder direct visualization of the PIN.

In the clinical case herein reported, we chose a modified posterolateral approach with an S-shape incision to minimize the risk of contractures and provide better exposure. We found a well encapsulated tumor that was wrapped around nerve fibers and was causing extrinsic compression of the PIN. After total excision of the lipoma, few nerve fibers had to be cut.

To the best of our knowledge, only 3 clinical cases of PIN syndrome caused by an intraneural lipoma leading to extrinsic compression have been described to date (►**Table 1**).

Despite the predictable bad functional prognosis considering the age of the patient and the duration of the symptoms (11 months), the clinical case herein reported shows a dramatic improvement in function and quality of life, without impairment in daily-life activities.

Conflict of Interests

The authors have no conflict of interests to declare.

References

1 Nakano KK. Nerve entrapment syndromes. Curr Opin Rheumatol 1997;9(02):165–173
2 Glover NM, Murphy PB. StatPearls [Internet]. StatPearls Publishing; Treasure Island (FL): Feb 7, 2019. Anatomy, Shoulder and Upper Limb, Radial Nerve
3 Kim DH, Murovic JA, Kim YY, Kline DG. Surgical treatment and outcomes in 45 cases of posterior interosseous nerve entrapments and injuries. J Neurosurg 2006;104(05):766–777
4 Lubahn JD, Cermak MB. Uncommon nerve compression syndromes of the upper extremity. J Am Acad Orthop Surg 1998;6 (06):378–386
5 Cravens G, Kline DG. Posterior interosseous nerve palsies. Neurosurgery 1990;27(03):397–402
6 Menorca RM, Fussell TS, Elfar JC. Nerve physiology: mechanisms of injury and recovery. Hand Clin 2013;29(03):317–330
7 Patel AP, Aoun SG, Al Tamimi M. Intraneural Posterior Interosseous Nerve Lipoma with Complete Paralysis: Case Report and Review of the Literature. Cureus 2018;10(05):e2689. Doi: 10.7759/cureus.2689
8 Yamamoto D, Yamauchi D, Tsuchiya H. Intraneural lipoma of the posterior interosseous nerve. J Hand Surg Eur Vol 2016;41(08): 882–883
9 Matsuo T, Sugita T, Shimose S, Kubo T, Yasunaga Y, Ochi M. Intraneural lipoma of the posterior interosseous nerve. J Hand Surg Am 2007;32(10):1530–1532

