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Case Report

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POSTERIOR INTEROSSEUS NERVE SYNDROME: CASE REPORT AND LITERATURE REVIEW

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ABSTRACT

Posterior interosseous nerve (PIN) lesion is rare. We report the case of a 33-year-old female patient who developed an isolated progressive extension deficit of the 3rd, 4th and 5th right fingers with pain on the anterior aspect of the elbow progressing for 5 months. Clinical examination did not find any paresthesia. Electromyography (EMG) showed partial axonotmesis of PIN. Surgical exploration found PIN compression by the supinator arch. The patient underwent neurolysis with full recovery within 2 months.

KEYWORDS: Posterior interosseous nerve- Arcade of Fröhse.

INTRODUCTION

PIN lesions are rare. PIN syndrome is most commonly caused by nerve compression in the forearm. We report a case of PIN compression by the supinator arch or arcade of Fröhse.

Anatomy

Radial nerve (RN) originates in the axillary hollow from the posterior cord of the brachial plexus, it passes through the triangular interval to engage in the posterior compartment of the arm over a length of approximately 9 cm. It then passes through the lateral intermuscular septum approximately 10-11 cm above the lateral epicondyle, and then travels into the sulcus bicipitalis lateralis.

The nerve enters the radial tunnel where it divides into a deep branch, which becomes the posterior interosseous nerve, and a superficial branch.

The sensory superficial branch passes in front of the superficial head of the supinator muscle, then remains medial to the brachioradialis. The PIN passes under the superficial head of the supinator muscle, then bypasses the neck of the radius from which it remains separated by the deep head of the supinator muscle and divides into its terminal branches intended for the extensors of the fingers, the thumb, and the extensor carpi ulnaris.

The proximal edge of the superficial layer of the supinator is aponeurotic in 30-57%.[1-3] and only constitutes a true arcade of Fröhse when there is real fibrous reinforcement of the proximal part of the muscle.[4] For Raimbeau & al,[4] the name arcade of Fröhse should only be given to fibrous formations.

CASE REPORT

The case is about a 33-year-old patient, right-handed, housewife, with no notable history including no penetrating trauma.

The patient was seen initially for pain in the elbow with isolated progressive extension deficit of the metacarpophalangeal (MCP) joints of the 3rd, 4th and 5th fingers of the right hand evolving for 5 months (Fig 1).

Clinical examination did not show any sensory deficit, and standard x-rays taken did not show any associated bone lesions.

EMG showed partial axonotmesis of the right PIN with normal sensory nerve conduction of the radial nerve. MRI excluded any tumor cause. We therefore thought of a compression of the PIN by the arcade of Fröhse corresponding to the PIN syndrome.

Given the consultation time, we immediately performed a neurolysis by an anterior approach. After locating the various elements, surgical exploration revealed PIN compression by the supinator arch (Fig 2). Macroscopic nerve continuity was confirmed and there was no tumor formation.

The arch of the supinator muscle was enlarged and the nerve released (Fig 3).

At the last follow-up, 2 months after this intervention, the patient completely recovered from her deficit.

Figure 1: Extension deficit of 3rd, 4th and 5th MCP joints.

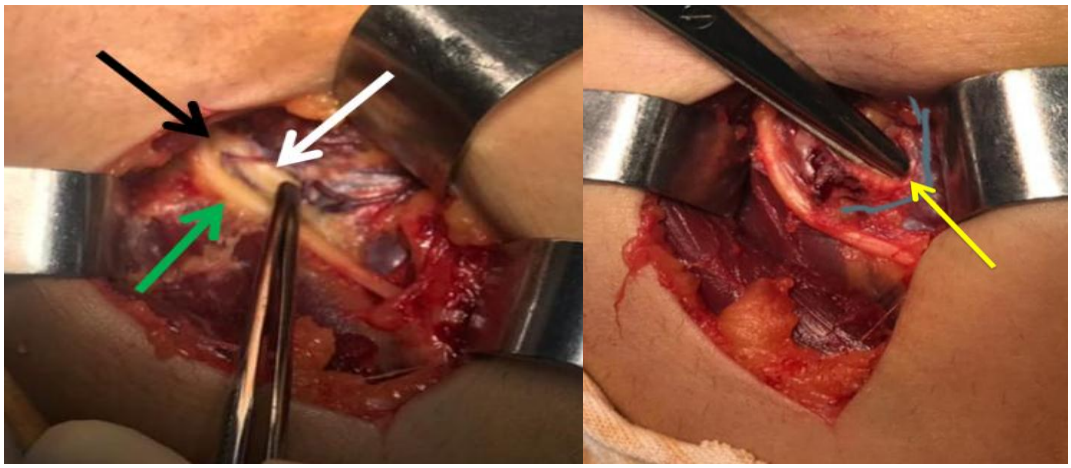

Figure 2: RN bifurcation and PIN compression by arcade of Fröhse ***Black arrow: RN bifurcation ; Green arrow: superficial branch of RN ; White arrow: PIN ; Yellow arrow : arcade of Fröhse.***

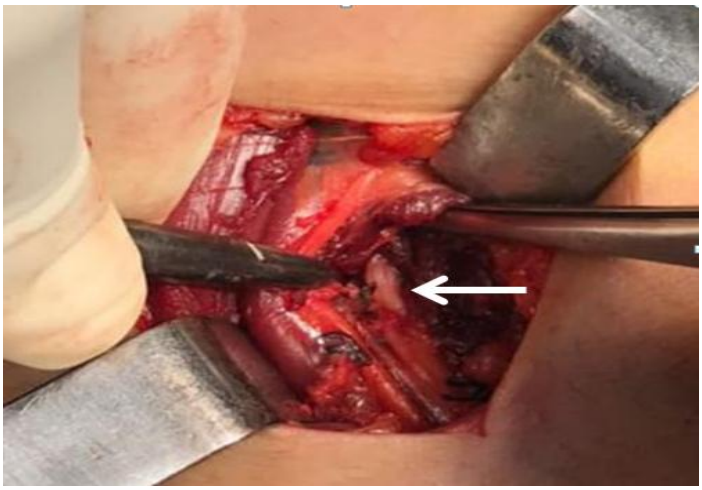

Figure 3: arcade of Fröhse release and neurolysis ***White arrow: PIN.***

DISCUSSION

Radial nerve compression at the elbow is less common than ulnar nerve compression.[4] The superficial branch involvement is exceptional. The deep branch lesion is manifested by two different entities:

- Radial tunnel syndrome, mainly described by Roles and Maudsley.[5] The manifestations are pain with absence of deficit. The painful manifestations merge with lateral epincodylalgia causes,[5,6] and are caused by dynamic, intermittent PIN compression by the fibromuscular structures of the radial tunnel.[7]

- PIN syndrome.[8-10] which is essentially deficient, with little or no pain.[11]

PIN syndrome is a rare syndrome.[12] It corresponds to the compression of the motor branch of the RN, during its penetration or its crossing of the supinator muscle.

It manifests as progressive paralysis of the extensors of the fingers (at first one finger and then the others) sometimes accompanied by pain in the anterior aspect of the elbow.[13] or the back of the hand.[6]

This paralysis is frequently incomplete and it respects the radial extensors of the carpal and the supinator. It causes a typical aspect of radial extension of the wrist by involvement of the extensor carpi ulnaris. There is no active extension of the MCP joints because the extensors of the fingers are affected. Extension of the interphalangeal joints, including that of the thumb, is still possible through the lumbrical and interossei muscles with median nerve and ulnar nerve innervation.[6]

EMG is fundamental to confirm the diagnosis and shows signs of denervation of the extensors of the fingers contrasting with the normal recordings of the more proximal muscle and normal sensory conduction of the superficial branch remains normal.[14–18]

Imaging is essential to eliminate a compressive cause by a tumor process (lipoma most frequently).[13]

The causes are preferably extrinsic by lipomas, synovial cysts and bursitis of the bicipital tuberosity.[19-22] The intrinsic forms can exceptionally come from an intraneural tumor or be idiopathic and are more frequent during exposure to repetitive gestures in pronosupination which generates a striction of the nerve on the proximal edge of the supinator muscle, especially in the case of a real arcade of Fröhse.[4,6,13]

Management depends on the time before consultation, age, preoperative EMG and imaging results. In the case of an expansive process, the treatment is immediately surgical. Otherwise, the operation can be delayed for a maximum of three months, beyond which, in the absence of recovery, neurolysis is required.

The intervention can be performed by an anterior or dorsolateral approach depending on the origin of the compression. Neurolysis releases PIN by sectioning superficial layer of the supinator muscle. The more the procedure is performed earlier in the evolution of the disease, the more functional results of neurolysis will be favorable.[23]

In complete and old paralysis and in persistent forms despite neurolysis, palliative surgery is recommanded.[2] Resuscitating the extension of the wrist and fingers by palliative transfers will be used. The results are generally satisfactory, but always remain inferior to good neurological recovery.[6]

CONCLUSION

PIN syndrome is a rare pathology whose ignorance induces diagnostic delay and therefore therapeutic delay, in particular for idiopathic cases. However, dissociated radial nerve palsy with respect for sensitivity is suggestive and should lead to the diagnosis. The EMG confirms the diagnosis. Neurolysis is indicated in the absence of rapid spontaneous recovery and in the case of tumor compression. It allows satisfactory postoperative results if it is performed early. Palliative surgery provides only partial benefit.

Consent

The patients have given their informed consent for the case to be published.

Competing Interests

The authors declare no competing interest.

Authors 'Contributions

All authors have read and agreed to the final version of this manuscript and have equally contributed to its content and to the management of the manuscript.

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