Severe Apraxia due to Entrapment of the Radial Nerve in the Arm: "Lotem Syndrome". Case Report

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ABSTRACT

We present the case of a 57-year-old male patient who consulted for high radial nerve palsy, with pain and positive Tinel test on the lateral side of the dominant arm, of sudden onset after great repetitive muscular efforts, without clinical improvement after three months of evolution. A decompressive surgical treatment was performed, presenting a rapid recovery since the 7th day and full recovery after 25 postoperative days. **Conclusion:** The entrapment of the radial nerve in the arm is a rare pathology and its clinical presentation may vary. We consider that in the face of no remission or favorable evolution of paralysis within the first three months of conservative treatment, surgery should be performed.

Keywords: Radial nerve; Lotem syndrome; nerve apraxia; nerve entrapment.

Level of Evidence: IV

Apraxia severa por atrapamiento del nervio radial en el brazo: "síndrome de Lotem". Presentación de un caso

RESUMEN

Se presenta el caso de un hombre de 57 años que consulta por parálisis alta del nervio radial, con dolor y prueba de Tinel positiva en la cara lateral del brazo dominante, de inicio súbito, luego de grandes esfuerzos musculares repetitivos, sin mejoría clínica al tercer mes de evolución. Se realizó un tratamiento quirúrgico descompresivo. El paciente tuvo una rápida recuperación a partir del séptimo día, y remisión completa a los 25 días de la cirugía. **Conclusión:** El atrapamiento del nervio radial en el brazo es un cuadro poco frecuente. Según los estudios publicados, la evolución clínica es variada, pero si no hay remisión o la evolución de la parálisis no es favorable en 3 meses, creemos que la cirugía es el tratamiento de elección.

Palabras clave: Nervio radial; síndrome de Lotem; apraxia; atrapamiento nervioso.

Nivel de Evidencia: IV

INTRODUCTION

High radial nerve palsy due to entrapment after repeated muscular efforts is an unusual condition and there is little published evidence on its treatment and evolution.

The radial nerve enters the arm through the triangular space to form part of the contents of the radial sulcus in close relation to the posterior face of the humeral diaphysis. Between 11 and 13 cm proximal to the lateral epicondyle, the nerve crosses the external intermuscular septum from posterior to anterior, in the direction of the lateral parabicipital groove.[1-3] The orifice that allows the passage of the nerve from the posterior to the anterior muscle compartment of the arm corresponds to a possible site of compression or distraction of the nerve.[1,3] Lotem[4] syndrome is known as compressive neuropathy of the radial nerve at said level. Depending on the severity of the compression, this affectation produces paralysis of the wrist extensors and the five fingers of the hand, generating severe apraxia and a significant inability to carry out activities of daily living.[3,4]

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The objective of this article is to report the case of a patient with severe apraxia of the radial nerve due to entrapment in the arm, who had a rapid recovery after surgical treatment.

CLINICAL CASE

A 57-year-old man consulted our institution for pain (8 points on the visual analog scale) in the lateral aspect of the middle third of the arm, of sudden onset after performing masonry work with repeated efforts, of three months' evolution. Physical examination revealed signs of motor paralysis of the dorsal compartment of the forearm, with extension impairment of the wrist and fingers corresponding to grade M0 of the *Medical Research Council* (MRC) scale for muscle strength, without compromise of elbow extension. The passive range of motion of the elbow, wrist, and hand was complete. In addition, he had hypoesthesia in the dorsum of the forearm and the hand in the territory of the radial nerve. Tinel's test was positive to percussion of the lateral region of the arm, mainly at a point located approximately 11 cm proximal to the lateral epicondyle. The QuickDASH questionnaire (*Disabilities of the Arm, Shoulder and Hand*) in the first visit yielded a score of 77.3 (Figure 1).

Figure 1. Clinical image in the immediate preoperative period. Flexion of the wrist and fingers is observed due to motor apraxia of the radial nerve.

Initially, while awaiting the results of imaging studies and electromyography, conservative treatment was indicated, consisting of rest with a thermoplastic splint in wrist extension and nonsteroidal anti-inflammatory drugs, in addition to occupational therapy to maintain full passive range of motion of the wrist and fingers, and physical therapy with weekly electrostimulation sessions.

The electromyogram three months after the onset of symptoms reported a severe injury to the radial nerve with possible axonotmesis.

Masses of surrounding tissue that could compress the radial nerve in its path were ruled out by means of radiography and magnetic resonance imaging, which confirmed an intact radial nerve.

With the requested studies and no evidence of clinical signs of motor or sensory recovery, surgical exploration was indicated.

A 6-cm longitudinal lateral arm approach centered on the high point was performed. It was followed by a deep dissection along the lateral intermuscular septum. The radial nerve was then identified at the exit of the radial sulcus. It was observed to be compressed between the external intermuscular septum and the muscle fibers dependent on the vastus lateralis of the triceps muscle. The vessels of the radial perineurium appeared to be congested without evidence of neuroma formation. In addition, the signs of compression increased dynamically, after flexion of the elbow and pronation of the forearm. The nerve was released after excising the surrounding tissue. Finally, a neurolysis (under magnification) was performed 3 cm proximal and distal to the decompression area (Figure 2).

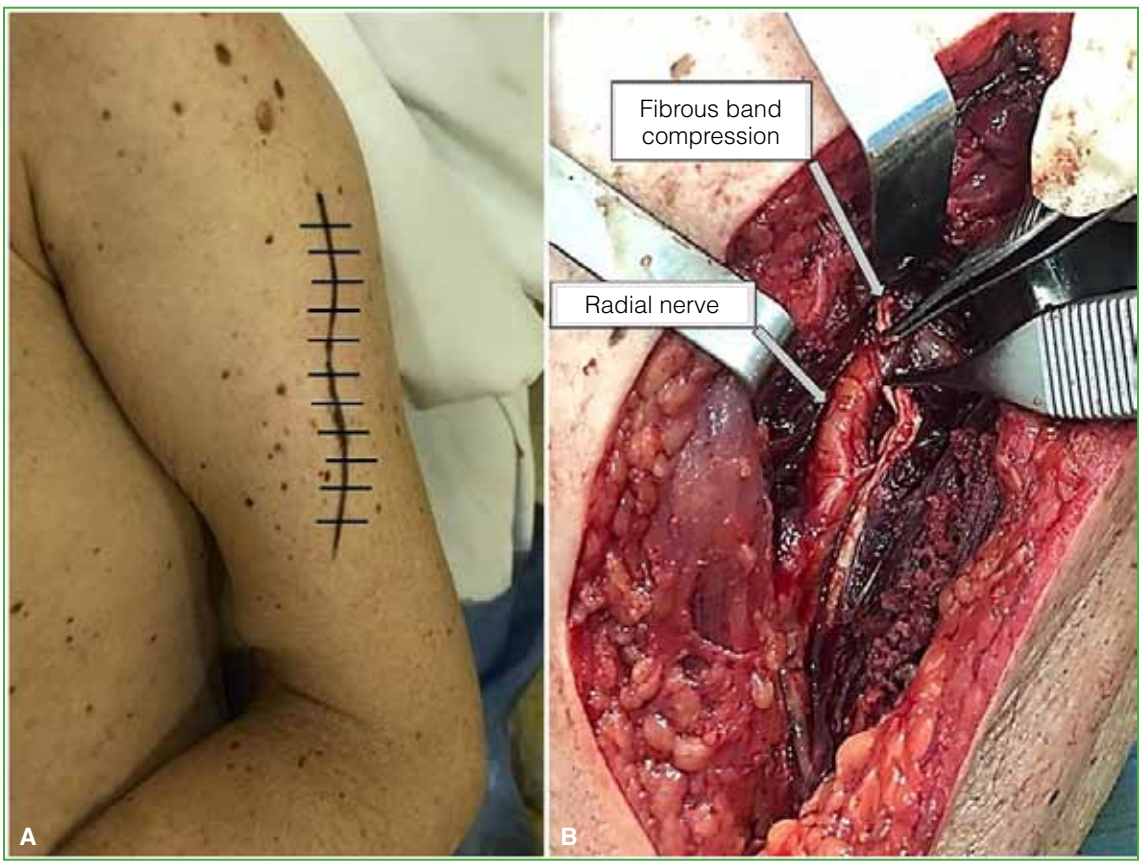

Figure 2. A. Marking of the lateral approach of the left arm. **B.** Intraoperative image. The compression of the radial nerve by a fibrous arch dependent on the lateral intermuscular septum can be observed. The radial nerve is congested.

In the first control 48 hours after surgery, no complications were detected. In the second control, on day 7, a weak extension of the wrist and fingers was observed (MRC scale = M2). On postoperative day 25, recovery of range of motion and strength of the wrist and fingers were complete (MRC = M5).

At the 12-month follow-up, no functional limitations were detected (MRC = M5), elbow and wrist ranges of motion were complete, sensory recovery was complete, and the QuickDASH score was 0 (Figure 3).

Figure 3. A. Partial recovery of wrist and finger extension. **B.** Full extension of the wrist and fingers 25 days after surgery.

DISCUSSION

Currently, there are few publications on severe apraxia due to compressive nerve injuries of the radial nerve in the lateral aspect of the arm. In comparison with these reports and with other patients treated in our Service, in the present case, a complete and early clinical recovery was obtained after surgical decompression.

In 1971, Lotem et al.[4] defined atraumatic compression of the radial nerve in the arm by publishing a series of three patients with transient radial nerve paralysis after repeated muscle exertion. They attributed its etiology to blockage in nerve conduction produced by a fibrous arch over the radial nerve at the lower end of the spiral groove, which was demonstrated by subsequent cadaveric dissections. They also found that this arch gave rise to accessory muscle fibers from the outer portion of the triceps. The authors associated post-exertional muscle edema with nerve compression at that level and proposed that people with large muscle mass were prone to this condition. Unlike our case, the three patients in this study had a progressive spontaneous recovery from the third day after the onset of symptoms.

In 1985, Sunderland[5] suggested an additional mechanism; he considered that the distal end of the radial sulcus can act as a fixation point in the course of the nerve, exerting excessive internal traction at that level in the event of a sudden and forced extension of the elbow. This clinical presentation has also been correlated with other potentially compressive pathologies, such as humeral exostoses, sequelae of humerus fractures, or tumors of the surrounding soft tissues.[6] These diagnoses were ruled out in our patient by interpreting the radiographs and magnetic resonance images.

It is believed that in these conduction blocks, complete recovery inevitably occurs after the cessation of the stimulus favoring nerve compression, since axonal continuity is preserved and the cause is naturally reversible. However, recovery may be delayed for several months or the condition may be irreversible.[5]

Mitsunaga and Nakano,[7] Manske,[8] Nakamichi, and Tachibana[9] reported cases of patients who underwent surgery more than a year after the onset of symptoms and did not show any signs of subsequent recovery. However, Lubahn and Lister[10] published a rare case: three of the five members of a family had spontaneously suffered high radial palsy (without a history of exertion). Among them, a 32-year-old woman consulted after progressing to progressive radial palsy over the course of 4 years. She was treated with surgical decompression and regained M4 to M5 motor strength after 6 months.

The evolution of this case coincides with Mackinon and Novak who recommend that "if there is no clinical evidence of recovery in 3 months, electrodiagnostic studies should be performed. If these show no evidence of reinnervation, we should consider the surgical release of the radial nerve."[11]

An oligosymptomatic form of presentation has been reported when the compressive mechanism is not of sufficient intensity to produce paresis/paralysis. In this case, the location and type of neuritic pain should guide the diagnosis. Adolfsson and Nettelblad,[12] in 1999, and Bowman et al.,[13] in 2018, published case series with no history of trauma, with increased local sensitivity, tingling sensation, and pain that increased upon the percussion of the radial nerve (Tinel's sign) at the distal lateral end of the arm, but without clinical or subjective signs of muscle weakness. Finally, they were treated by surgical decompression of the radial nerve in the canal proximal to the lateral intermuscular septum, with successful results.

The singularity of the case should be highlighted, since the limited reports that required surgical decompression were palsies of a very long evolution in which a satisfactory result was not obtained or had mild symptoms without motor involvement.

Despite its low incidence, we must be familiar with this compression site to ensure early diagnosis and timely treatment, since delayed radial nerve release is associated with poor recovery of nerve function.[14]

We can conclude that, although Lotem's syndrome is an infrequent condition, it is one of the causes of high atraumatic paralysis associated with repeated efforts of the radial nerve. It is important to bear in mind that, given its natural evolution towards complete recovery within the first month from the onset of symptoms, the initial treatment of choice may be conservative. If symptoms persist for three months without improvement, surgery should be indicated for the decompression of the radial nerve at its exit from the radial sulcus, at the level of the lateral intermuscular septum. With this procedure it is feasible to achieve a recovery without sequelae of the radial nerve.

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