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Postictal median nerve injury: A rehabilitation case report

Lesión del nervio mediano postictal: reporte de un caso de rehabilitación

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SUMMARY

Median nerve injuries due to post-ictal trauma or falls are rare. Still, they can lead to significant hand dysfunction, particularly in patients with comorbidities like diabetes mellitus, which impairs nerve regeneration. This report aims to present a case of post-ictal traumatic median nerve injury and evaluate the effectiveness of a multidisciplinary rehabilitation approach combining conventional and advanced physiotherapeutic interventions. A 52-year-old male with poorly controlled type 2 diabetes and a history of generalized tonic-clonic seizures sustained a median nerve transection following a seizure-induced fall. After surgical repair, he underwent a 4-week rehabilitation program including focused extracorporeal shockwave therapy (ESWT), sensory re-education, self-administered median nerve mobilization and task-oriented training. Outcome measures included nerve conduction velocity (NCV), two-point discrimination (2PD), and the Jebsen Taylor Hand Function Test (JHFT). Post-intervention, motor NCV improved from 42 m/s to 53 m/s, and sensory NCV from 38 m/s to 47 m/s. Two-point discrimination improved from 8 mm to 5 mm. Functional improvements were observed across all JHFT subtests, indicating enhanced dexterity and sensory recovery. A combined rehabilitation approach involving ESWT, self-mediated nerve mobilization, sensory re-education, and task-oriented training led to significant improvements in nerve function, hand performance, and overall quality of life.

Keywords: *Median nerve, epilepsy, rehabilitation, quality of life.*

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RESUMEN

Las lesiones del nervio mediano debidas a traumatismos o caídas postictales son poco frecuentes, pero pueden provocar una disfunción significativa de la mano, especialmente en pacientes con comorbilidades como la diabetes mellitus, que dificulta la regeneración nerviosa. El objetivo de este reporte es presentar un caso de lesión traumática postictal del nervio mediano y evaluar la eficacia de un enfoque de rehabilitación multidisciplinario que combina intervenciones fisioterapéuticas convencionales y avanzadas. Un hombre de 52 años con diabetes tipo 2 mal controlada y antecedentes de convulsiones tónico-clónicas generalizadas sufrió una transección del nervio mediano tras una caída inducida por convulsiones. Tras la reparación quirúrgica, se sometió a un programa de rehabilitación de 4 semanas que incluyó terapia de ondas de choque extracorpóreas (TOCE), reeducación sensorial, movilización autoadministrada del nervio mediano y entrenamiento orientado a tareas. Las medidas de resultado incluyeron la velocidad de conducción nerviosa (VCN), la discriminación de dos puntos (DMP) y la prueba de función manual de Jebsen-Taylor (JHFT). Tras la intervención, la velocidad de conducción nerviosa (VCN) motora mejoró de 42 m/s a 53 m/s y la VCN sensorial de 38 m/s a 47 m/s. La discriminación de dos puntos mejoró de 8 mm a 5 mm. Se observaron mejoras funcionales en todas las subpruebas de la JHFT, lo que indica una mayor destreza y una mejor recuperación sensorial. Un enfoque de rehabilitación combinado que incluía ESWT, automovilización del nervio mediano, reeducación sensorial y entrenamiento orientado a tareas condujo a mejoras significativas en la función nerviosa, el rendimiento de la mano y la calidad de vida en general.

Palabras clave: *Nervio mediano, epilepsia, rehabilitación, calidad de vida.*

INTRODUCTION

Post-ictal states following seizures often involve temporary neurological symptoms like confusion, drowsiness, weakness (Todd's paresis), headache, and brief sensory or motor deficits, usually resolving within minutes to hours (1). While usually self-limiting, post-ictal seizures may sometimes lead to falls or contact with machinery, causing traumatic musculoskeletal or nerve injuries (2). The median nerve, arising from the brachial plexus, controls key motor and sensory functions of the forearm and hand. Injury can impair grip and dexterity, affect daily tasks, and reduce independence and quality of life (3). Causes include trauma, compression neuropathies, and rarely, post-ictal falls (4). Carpal tunnel syndrome affects 3–6% of adults, while traumatic injuries make up 6–8% of upper limb nerve cases. Post-seizure injuries are rare but clinically significant (5).

Peripheral nerve injury repair is often challenging because of the complexity of the structure (6). Various interventions are available for median nerve injury, including surgical and physiotherapy approaches. Surgical treatment for median nerve injury includes direct nerve repair, nerve grafting for larger gaps, or decompression in cases of entrapment (7). In chronic cases, tendon transfer can improve hand function, whereas post-surgical rehabilitation focuses on pain control, nerve mobilization, strengthening, sensory retraining, and task-based therapy. In acute phases, treatment targets inflammation and joint protection to preserve muscle tone and promote recovery through repetitive, task-specific exercises (8). The advanced treatment plan includes Extracorporeal Shock wave therapy (ESWT), which has increasingly gained attention for its therapeutic potential in neurological disorders, including peripheral nerve injuries (PNI). Recent insights into its cellular and molecular mechanisms suggest that ESWT may play a transformative role in neurorehabilitation by enhancing neuroplasticity, promoting angiogenesis, and supporting axonal regeneration (9).

This case sheds light on a rarely seen condition, median nerve injury following a seizure. It highlights the importance of early identification, comprehensive assessment, and rehabilitation using both conventional and advanced modalities. It also underscores the value of integrating clinical reasoning with patient-centered care, particularly when addressing complex presentations that deviate from typical diagnostic patterns.

CASE PRESENTATION

A 52-year-old male with a known history of generalized tonic-clonic seizures since childhood and poorly controlled type 2 diabetes mellitus for the past 5 years, presented to the rehabilitation

department with complaints of numbness, burning sensation over the thenar eminence, and reduced grip strength in his left hand. He was on sodium valproate 500 mg twice daily for seizure control and metformin 1000 mg/day for diabetes, though adherence was reported as irregular (Table 1). Upon detailed history taking, it was revealed that three months prior, the patient experienced a seizure episode at his workplace. During the episode, he fell and struck his left wrist against an exposed machine edge, resulting in trauma to the volar aspect of the wrist. Emergency imaging and clinical evaluation revealed a transection of the median nerve, along with injury to the flexor digitorum superficialis (FDS) and flexor digitorum profundus (FDP) tendons. He underwent a microsurgical procedure involving epineural repair of the median nerve and flexor tendon repair on January 10, 2025. Despite surgery, at his 3-month follow-up, the patient reported persistent discomfort over the thenar region, difficulty performing fine motor tasks, and ongoing neuropathic symptoms. His background of poorly controlled diabetes raised concern about delayed nerve regeneration and prolonged recovery.

On examination, a well-healed volar wrist scar and thenar muscle wasting indicated motor denervation. There was tenderness over the carpal tunnel, with reduced soft tissue bulk, suggesting atrophy and post-surgical scarring. Motor testing showed weakness of thumb opposition (MRC Grade 3/5). Flexion of the index and middle fingers was limited, likely due to prior flexor tendon injury. Sensory deficits included impaired two-point discrimination and stereognosis over the lateral 3½ digits. Positive Phalen's and Tinel's signs indicated ongoing nerve irritation or incomplete regeneration. The problem list is outlined in Table 2 using the ICF classification system.

Table 1. Demographic data of the participant.

Age	52
Gender	Male
Weight	69 kgs
Height	158 cm
Occupation	Machine operator
Cognitive status	Intact
Dominant hand	Right
Comorbidities	generalized tonic-clonic seizures since childhood; Type 2 diabetes mellitus for 5 years

Table 2. Problem list based on ICF classification.

Body Structure	**Body Function**	**Activity Limitation**	**Participation Restriction**	**Personal Factors**	**Contextual Factors**
Transsection of the median nerve in the left wrist; injury to the FDS and FDP tendons.	1. Weakness in thumb opposition (MRC Grade 3/5) 2. Reduced grip strength (10 kg vs 28 kg) 3. Diminished tactile sensation and stereognosis	Difficulty with fine motor tasks (e.g., grasping, manipulating objects) Reduced finger flexion (index and middle)	Inability to fully perform occupational duties as a machine operator Reduced independence in tasks requiring hand dexterity	Positive: Cognitively intact, motivated, right-hand dominant Negative: Poor medication adherence, history of poorly controlled diabetes and seizures	Delayed nerve recovery due to diabetes and the presence of post-surgical scarring is limiting rehabilitation engagement.

Note: FDS – Flexor Digitorum Superficialis, FDP – Flexor Digitorum Profundus, MRC - Medical Research Council.

Intervention

Informed consent was obtained from the patient before the intervention. Focused Extracorporeal shockwave therapy (Chattanooga) was administered using an energy flux density of 0.15 mJ/mm², a frequency of 5 Hz, and delivering 1 500 pulses per session (10). Sensory re-education involved tactile stimulation using various textures and shapes, manipulation of small objects, and active movement of the unaffected hand. These activities were performed for 20 minutes per session to generate a visual illusion of movement in the injured hand, thereby stimulating cortical reorganization and promoting recovery of sensory function (11). A qualified physiotherapist instructed the patient on self-median nerve mobilization exercises. The patient performed the exercises for 15 seconds, then rested for 10 seconds. This cycle was repeated 3 times per session (12).

Task-oriented training (TOT) was performed for 30 minutes to stimulate nerves, comprising six activities: pressing numbered bells for finger control, moving a rubber ball for grip strength, and peg transfer for precision (Figure 1). Tasks such as picking up coins (Figure 2) or buttons, and thumb opposition, targeted dexterity. At the same time, simulated daily activities such as buttoning fabric and opening zippers helped restore practical hand function and independence. Task difficulty was adjusted by varying the number, direction, size, and distance of targets based on the participant's ability. Training was performed in a seated position with 90° flexion at the hips, knees, and ankles (13).

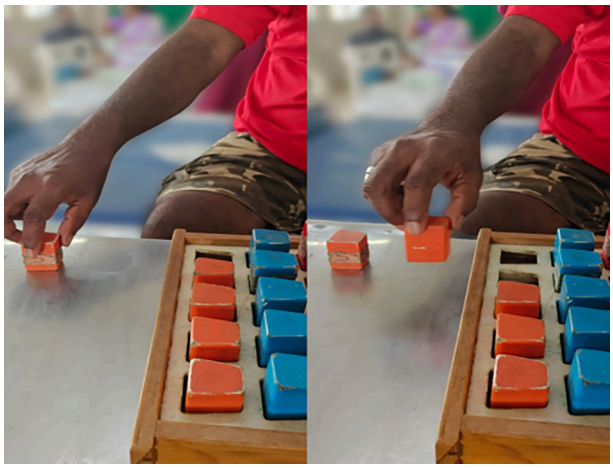

Figure 1. Performing the pegboard exercise.

Figure 2. Picking up coins.

The morning session comprised 20 minutes of sensory re-education using tactile and visual stimuli and focused extracorporeal shockwave therapy (fESWT). The evening session included 30 minutes of task-oriented training (TOT) (Figure 1), followed by 10 minutes of self-median nerve mobilization exercises, with brief rest periods integrated. All interventions were administered 4 days per week, with 1 session per day for a total of 4 weeks. The complete clinical timeline is presented in Figure 3.

Outcome measures

Nerve conduction velocity (NCV) was used as a valuable outcome measure because it objectively assesses the nerve's functional status and recovery. Two-point discrimination (2PD) assesses the ability to distinguish two closely spaced tactile points, reflecting fine sensory recovery after median nerve injury. The Jebsen-Taylor Hand Function Test is used as an additional outcome measure to assess hand dexterity and

Figure 3. Timeline of Clinical Events.

functional ability in patients with median nerve injury. It evaluates performance on everyday tasks, thereby quantifying improvements in fine motor skills and hand function during rehabilitation.

RESULT

Following the 4-week rehabilitation program, the patient showed notable improvements across all outcome measures. Motor nerve conduction velocity increased from 42 m/s to 53 m/s, and sensory conduction velocity improved from 38 m/s to 47 m/s. Two-point discrimination over the palmar aspect of the lateral 3½ fingers improved from 8 mm to 5 mm, indicating enhanced tactile sensitivity. The Jebsen Taylor Hand Function Test revealed reduced task completion times in all subtests, particularly in writing (from 29.12 to 18.09 seconds) and lifting small objects (from 9.56 to 7.69 seconds) (Table 3). These results collectively indicate significant gains in nerve function, sensory perception, and fine motor performance. At one-month follow-up, the patient was interviewed by telephone regarding their experience with the treatment. The patient expressed satisfaction with the intervention and reported a positive experience with the therapy.

Table 3. Pre- and post-intervention values outcomes: Nerve conduction, Sensory Discrimination and hand functional performance.

Outcome Measure	Parameter	Pre-Test (Baseline)	Post-Test (4- Week)	Delta value
Nerve Conduction Study	Motor conduction velocity	42 m/s	53 m/s	+11
	Sensory conduction velocity	38 m/s	47 m/s	+9
Two-Point Discrimination	Palmar aspect of the lateral 3 and half fingers	8 mm	5 mm	-3 mm
Jeberson Taylor Hand Function Test	Writing	29.12 seconds	18. 09 seconds	–11.03
	Simulated page turning	7.05 seconds	4.98 seconds	–2.07
	Lifting small objects	9.56 seconds	7.69 seconds	-1.87
	Simulated feeding	5.77 seconds	4.95 seconds	-0.82
	Stacking checkers	2.79 seconds	2.54 seconds	-0.25
	Lifting large, light objects	3.36 seconds	2.86 seconds	-0.50
	Lifting large, heavy objects	4.59 seconds	4.23 seconds	-0.36

DISCUSSION

This case describes the rehabilitation of a 52-year-old male with traumatic median nerve injury, complicated by uncontrolled diabetes and seizures. Recovery was prolonged due to flexor tendon damage and impaired nerve healing (14). A four-week multidisciplinary rehab program targeted both nerve regeneration and sensory integration.

In this case, a multimodal rehabilitation protocol was implemented to address both peripheral nerve healing and functional hand recovery following a complex median nerve injury. The selected interventions were grounded in emerging evidence supporting their individual and synergistic effects on nerve regeneration and functional outcomes. Focused extracorporeal shockwave therapy (ESWT) at low energy (0.01–0.15 mJ/mm^2) has shown potential to promote nerve regeneration and reduce neuropathic pain by modulating nitric oxide and neurotrophic factors such as NGF and VEGF (15). Sensory re-education, including texture discrimination, object handling, and mirror therapy, supports cortical reorganization and sensory recovery (16). Median nerve mobilizations enhance neural gliding, reduce adhesions and improve axoplasmic flow, with evidence supporting their role in improving motor and sensory function in nerve injuries (17). Evidence also suggests that combining somatosensory and motor training may be more effective than either intervention alone, as it enhances plasticity and accelerates functional recovery (18,19).

Task-oriented training (TOT) played a critical role in restoring purposeful hand use by emphasizing repetition, relevance, and progression. According to Kim et al. (2016), TOT improves both motor learning and peripheral sensory input by involving the patient in goal-directed activities. In this case, TOT included activities such as pressing bells and manipulating small objects, resulting in measurable improvements in hand dexterity (20). These gains were reflected in the Jebsen-Taylor Hand Function Test (JHFT), where task times improved across all domains, consistent with research that highlights the JHFT as a reliable tool for evaluating hand function post-nerve injury. The need for precise rehabilitation strategies becomes even more crucial, especially when complicated by systemic conditions such as diabetes (21). According to Fukumoto et al. (2023), increased conduction velocity is positively associated with better fingertip dexterity and reduced subjective complaints, highlighting the clinical relevance of these gains (22,23).

The strength of this case lies in its innovative, multidisciplinary rehabilitation approach that demonstrated measurable improvements in nerve conduction and hand function. However, the report has several limitations, including its single-case design, which limits generalizability, and the short intervention duration, which may not reflect long-term recovery outcomes. The absence of blinding and a control group introduces potential observer bias, making it difficult to isolate the true effect of the rehabilitation program. It is recommended that future research include larger sample sizes, longer rehabilitation durations, and blinded assessments to validate and strengthen these preliminary findings.

CONCLUSION

Focused shockwave therapy, sensory re-education, nerve mobilization, and task-oriented training effectively improved nerve conduction, tactile sensitivity, and hand function. Improvements observed in both clinical assessments and electrophysiological measures provide strong evidence of nerve regeneration. These findings underscore the importance of an integrated rehabilitation approach that addresses both the biological and functional aspects of peripheral nerve recovery and enhances overall well-being.

Information disclosure statement

Ethical Clearance

The Institutional Ethics Committee approved this study for Human Research under protocol number 05/04/2025/ISRB/FR/SCPT.

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