CASE REPORT

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Ischemic Monomelic Neuropathy Secondary to an Injury at Axilla

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ABSTRACT Ischemic monomelic neuropathy (IMN) is defined as the infarction of the distal part of axons in the peripheral nervous system because of a reduced blood flow to the relevant extremity. When suspected of the presence of such a case, it is essential to perform an electroneuromyography (ENMG) test and to detect the damaged area. In this report, we presented a case of a male patient having a stabbing injury at his left axilla and diagnosed with IMN, since peripheral nerve damage developed farther away from the distal part of the same extremity. Moreover, we aimed to emphasize the importance of IMN diagnosis in patients with trauma, which is usually ignored because of being an infrequently recognized type of neuropathy.

Keywords: Neuropathy; ischemic monomelic neuropathy; electromyography

Ischemic monomelic neuropathy (IMN) is an infrequent kind of neuropathy, developing acutely due to impaired circulation of an extremity and ischemia of nerves. It may develop depending upon proximal incision, acute arterial embolism, or acute arterial occlusion along with following shunt placement and arteriovenous fistula for hemodialysis. Other tissues such as muscle and skin do not present any ischemia findings; only nerve tissue develops infarction.[1,2] IMN has been reported mostly in diabetic patients with a predisposition to ischemia.[3] Besides, hypertension, advanced age, female gender, and alcohol usage are the most common risk factors for IMN.[4]

Electrodiagnostic features indicate axonal involvement of the peripheral nerve in which there is a partial decrease in the amplitude and nerve conduction velocity in both sensory and motor nerves.[3]

In this study, a patient with a stabbing injury at his axilla and therefore developed IMN was presented with all clinical and electroneuromyography (ENMG) findings.

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A 54-year-old male patient complaining about weakness and numbness in his left arm after a stabbing injury was examined by orthopaedists and referred to ENMG laboratory. A nearly 15-cm-length incision adjacent to the axilla on the inner side of the left arm was detected (Figure 1). Muscle strengths were as follows: left-hand finger and wrist joints- flexion and adduction/abduction, 3+/5; extension, 4/5 (Figure 2). Neither shoulder abduction nor elbow flexion-extension weakness was observed in the patient. However, hypoesthesia was observed on his hand's palmar and dorsal surfaces. In the ENMG of the patient referred to us in the 4th year of the stabbing injury, the left median and ulnar motor latency were prolonged, the nerve conduction velocity in the forearm segments slowed down, and the percentage of amplitude decreased (Table 1).[1-5] Digit sensory responses during finger movements and the median and ulnar nerve responses at the wrist and elbow were not obtained. Motor conduction velocity of the radial nerve was

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FIGURE 1: Incision scar of patient.

FIGURE 2: Finger flexion-extension weakness.

normal, whereas the superficial sensory branch of the radial nerve was obtained with low amplitude. These findings were evaluated as partial damage to the same extremity's median, ulnar and radial nerves. Chronic neurogenic denervation was detected in the distal muscles- abductor pollicis brevis and abductor digiti minimi- and the proximal muscles- flexor carpi ulnaris and flexor carpi radialis- innervated by these nerves. The lesion site of the median-ulnar nerves was considered at the elbow, owing to the proximal muscle affection and the absence of the wrist and elbow response. The lesion of the radial nerve was at the level of the forearm since the extensor indicis proprius, the most distal muscle innervated by radial nerves, demonstrated chronic neurogenic changes and the triceps, also known triceps brachii muscle, was normal. Besides, axillary nerve motor conduction latency was prolonged. Chronic neurogenic changes were also observed in the deltoid muscle. For this reason, the fact that there was damage to the left axillary nerve was considered.

In severe blood loss, more distal peripheral nerve damage may develop in the same extremity. Considering the complaints of the patient and the incision site, he was taken to the operating theatre immediately, and an axillary artery injury was envisaged. The patient was diagnosed with IMN following ENMG findings because it developed in the relevant extremity, and the distal part of multiple nerves was affected.

The informed consent form was obtained from the patient.

DISCUSSION

Ischemia can occur in tissues like muscle and joints when circularity impairment develops due to arterial embolism, arterial thrombosis, or incision. IMN is a clinical condition that occurs due to peripheral nerve dysfunction without developing any necrosis in the muscle and other tissues. IMN occurs in the setting of mild to moderate ischemia.

Coldness, paleness, and pain in the extremity, absence of pulse, tropic changes in the skin and nails, and accompanying neurological signs and findings are the principal indicators of arterial perfusion disorder. However, apart from these indicators, peripheral arterial perfusion disorder may present with milder neurological symptoms. Axons of peripheral nerves are the most susceptible tissue to ischemia, and only these nerves may be affected in short-term

TABLE 1: Electroneuromyography.

Muscle	Spontaneous activity	Motor unit			
Left Abductor pollicis brevis		Long duration (17 ms) MUAP, Decreased interference			
Adductor digiti minimi		Long duration (20 ms) MUAP, Decreased interference			
I. dorsalis interosseus		Atrophic muscle, 0.4 mV MUAP transition, Decreased interference			
Ekstensor indisis proprius		Long duration (17 ms) MUAP, Decreased interference			
Biseps		Normal MUAP, Interference pattern			
Triceps		Normal MUAP, Interference pattern			
Deltoid		Polyphasicity MUAP, Interference pattern			
Fleksor Carpi Ulnaris		Long duration (17 ms) MUAP, Decreased interference			
Fleksor Carpi Radialis		Long duration (17 ms) MUAP, Decreased interference			
Nerve	Distance (mm)	Latency(ms)	Velocity(m/s)	Amplitude (µ-mV)	Response
Left median motor	260	5,09	30,7	2mv	F:41,2ms
Ulnar motor (wrist-below the elbow)	240	4,80	30,1	4,5mv	F:27,8ms
(below the elbow-above the elbow)	80	1,44	55,4	1,87mv	
Radial superfisial sensory	125	2,48	50,4	8µv	
Median sensory (3.finger-wrist)		Absent potential			
(mid palm-wrist)		Absent potential			
(2. finger-wrist)		Absent potential			
(1. finger-wrist)		Absent potential			
Ulnar sensory (5. finger-wrist)		Absent potential			
Ulnar motor (I. dorsal interosseous-wrist)		Absent potential		0,2mv	
Radial motor	250	2,36	60,1	5mv	
Muskulocoteneus (erb-biseps)	250	4,68		7mv	
Radial (erb-triseps)	250	4,28		5mv	
Aksillaris (erb-deltoid)	180	4,68		5mv	
Ulnar sensory (wrist-elbow)		Absent potential			
Median sensory (wrist-elbow)		Absent potential			

MUAP: Motor unit action potential, mV: millivolt, µv: microvolt, ms:millisecond, m/s: meter/second, mm: millimeter.

hypoperfusion cases without any damage to other tissues.[1,2]

Motor and sensory nerve conduction studies are substantial to demonstrate the presence of nerve damage; however, the loss of amplitude or any response may be observed in the studies in question. Therefore, electromyography (EMG) is required to be performed for localization. Compared to motor nerve conduction studies, ulnar nerve lesions present more abnormalities considering the findings of sensory nerve conduction studies. The rate of pathological findings is high in orthodromic recordings from the proximal part in contrast to antidromic superficial recordings from the distal part.[5]

EMG findings are essential for localization, and the damaged area is in the proximal part primarily to the most proximal denervated muscle. Moreover, the more proximal mixed nerve conductions such as median and ulnar at the wrist and elbow may help detect the damaged area. The absence of any response also indicates that the lesion site may be in the more proximal part.

In this study, we presented a case of hypoesthesia and motor weakness in the arm due to axillar artery injury from the left axilla. However, this case is remarkable in demonstrating peripheral nerve damage, which developed in the more distal part, not in the damaged area.

Peripheral nerve damage may develop at the site of incision or intervention when neurological symptoms such as numbness and foot and hand drops occur following injury, trauma, or surgical intervention. Nonetheless, the fact that IMN may develop in the distal part of the relevant extremity and in the presence of any findings indicating multiple neuropathies should be considered.

IMN is a rare condition; however, it must be kept in mind in vascular-nerve injuries. Otherwise, it is likely to detect nerve damage secondary to trauma at the site of trauma. In such a condition, ischemic damage that has developed in the more distal part may be overlooked.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

All authors contributed equally while this study preparing.

REFERENCES

1. Wilbourn AJ, Furlan AJ, Hulley W, Ruschhaupt W. Ischemic monomelic neuropathy. Neurology. 1983;33(4):447-51. [Crossref] [PubMed]
2. Levin KH. AAEE case report #19: ischemic monomelic neuropathy. Muscle Nerve. 1989;12(10):791-5. [Crossref] [PubMed]
3. Sheetal S, Byju P, Manoj P. Ischemic monomelic neuropathy. J Postgrad Med. 2017;63(1):42-3. [Crossref] [PubMed] [PMC]
4. Shin KJ, Park JK. Neurological and electrophysiological parameters as outcome measurements for peripheral arterial occlusive disease. Ann Vasc Surg. 2014;28(7):1703-11. [Crossref] [PubMed]
5. Ertekin C. Pleksus brakialisten çıkan sinirler. Sentral ve Periferik EMG: Anatomi-Fizyoloji-Klinik. Birinci baskı. İzmir: Meta Basım; 2006. p.387-453.