CASE REPORT

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Medial Antebrachial Cutaneous Nerve Injury During Routine Venous Blood Collection: Could A Low Body Mass Index be A Risk Factor?

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Abstract

The medial antebrachial cutaneous nerve (MACN) is rarely affected on its own. MACN injury may occur as a result of trauma or compression. We present a 23-year-old female patient with neuropathy of the anterior branch of the MACN, associated with venous blood collection from the left antecubital fossa. This case aims to contribute to the understanding of MACN injury by presenting clinical findings, neurophysiological results, and possible risk factors, including low body mass index (BMI). The patient had severe pain in the medial forearm during the blood collection procedure. The patient's BMI was 17.6 kg/m^2. Patients' score on the Leeds Assessment of Neuropathic Symptoms and Signs scale was 19. In the sensory nerve conduction study, the left MACN amplitude was found to be lower than that of the right. The findings in this case indicate that neuropathic pain may represent a major component of the clinical picture in MACN injury. This case also raises the possibility that a low BMI could increase vulnerability to such neuropathies. Accordingly, procedures involving venipuncture or intravenous access may require greater caution in individuals with low BMI.

Keywords: Body mass index, medial antebrachial cutaneous nerve, peripheral neuropathy, venous blood collection

INTRODUCTION

The medial antebrachial cutaneous nerve (MACN), originating from the medial cord of the brachial plexus, provides sensory innervation to the medial aspect of the forearm. Isolated involvement of the MACN typically results in sensory deficits in the medial forearm without associated motor weakness.[1,2] MACN involvement is possible in brachial plexopathies in which the lower trunk is affected or in diseases such as thoracic outlet syndrome.[1,2] Isolated MACN involvement is rare.[3-6] It has been reported that MACN injury may develop as a result of MACN neuroma or compression of the MACN by a disorder such as a lipoma or from invasive interventions on the elbow region.[3,5-7]

Nerve injury following venipuncture is uncommon, with an estimated incidence of approximately 1 in 65,000, while neuropathic pain occurs in about 1 in 30,000 cases.[8,9] A study by Tsukuda et al.[8] reported 16 nerve injuries following just over one million venipunctures, eight of which involved the MACN, suggesting an estimated incidence of approximately one MACN injury per 135,000 venipunctures. Nonetheless, the potential for neuropathic pain underscores the need to recognize such injuries.[9] Moreover, the fact that MACN injury does not occur in every patient suggests that certain individuals may be more susceptible. Therefore, the rarity of this condition, the associated risk of neuropathic pain, and the uncertainty regarding patient susceptibility highlight the importance of identifying and reporting these cases. We present a

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patient who developed MACN injury after venous blood collection from the antecubital fossa. This case is presented to draw attention to a rare complication involving isolated MACN injury after venous blood collection from the antecubital fossa and to emphasize the potential role of individual risk factors, such as a low body mass index (BMI).

CASE REPORT

A 23-year-old female nurse had severe pain and a tingling sensation on the medial left forearm, immediately following a venous blood collection from the antecubital fossa for a routine blood biochemical examination. The patient stated that there was a slight swelling in the region where the injection was made, and then, this swelling decreased within weeks. Four months later, she was referred to our clinical neurophysiology laboratory. The patient initially considered the symptoms to be temporary and did not pursue medical attention. However, as the pain, paresthesia, and sensory disturbances persisted and began to affect her daily functioning, she was referred for further evaluation. During the four-month interval, no specific medical treatment was administered, and no neurological evaluation was performed. She did not receive analgesics or undergo physical therapy. The referral to our laboratory was her first neurophysiological assessment related to these complaints. The patient did not have a chronic disease. The patient's height, weight, and BMI were 158 cm, 44 kg, and 17.6 kg/m^2, respectively. The patient had pain, allodynia, tingling, hypoesthesia, and decreased pain-temperature sensation on the region innervated by the anterior branch of the MACN (Figure 1A). Muscle strength examination was normal. The Turkish version of the Leeds Assessment of Neuropathic Symptoms and Signs scale (LANSS) was applied to the patient.[10] The scores of the pain questionnaire and sensory testing of LANSS were eleven and eight, respectively. The patient reported a mean Visual Analog Scale (VAS) score of 6 for pain during the four-month period between symptom onset and her presentation to the clinical neurophysiology laboratory. The patient was not followed longitudinally after the neurophysiological evaluation. Neuropathic pain assessment using the LANSS and VAS scales was performed only once at the time of presentation.

Previously recommended methods and normal values were used for median and ulnar nerve conduction studies.[11] The nerve conduction study of MACN was performed antidromically as previously suggested.[12,13] The lower reference limits for MACN compound nerve action potential (CNAP) amplitude and nerve conduction velocity were 10 µV and 41.7 m/s, respectively.[12] Sensory nerve conduction study findings of median, ulnar, lateral antebrachial cutaneous, and superficial radial nerves were normal. The left MACN CNAP amplitude was lower than the right side's amplitude. The nerve conduction study of bilateral MACNs is shown in Figure 1B. Median and ulnar motor nerve conduction study findings and F-waves of these nerves were normal. The needle electromyography findings of the left abductor pollicis brevis, the first dorsal interosseous, the abductor digiti quinti, the extensor indicis proprius, the biceps brachii, the triceps, and the deltoid muscles were normal. There was no abnormality in the direct X-ray and magnetic resonance imaging (MRI) of the elbow and forearm. Written informed consent was received from the patient.

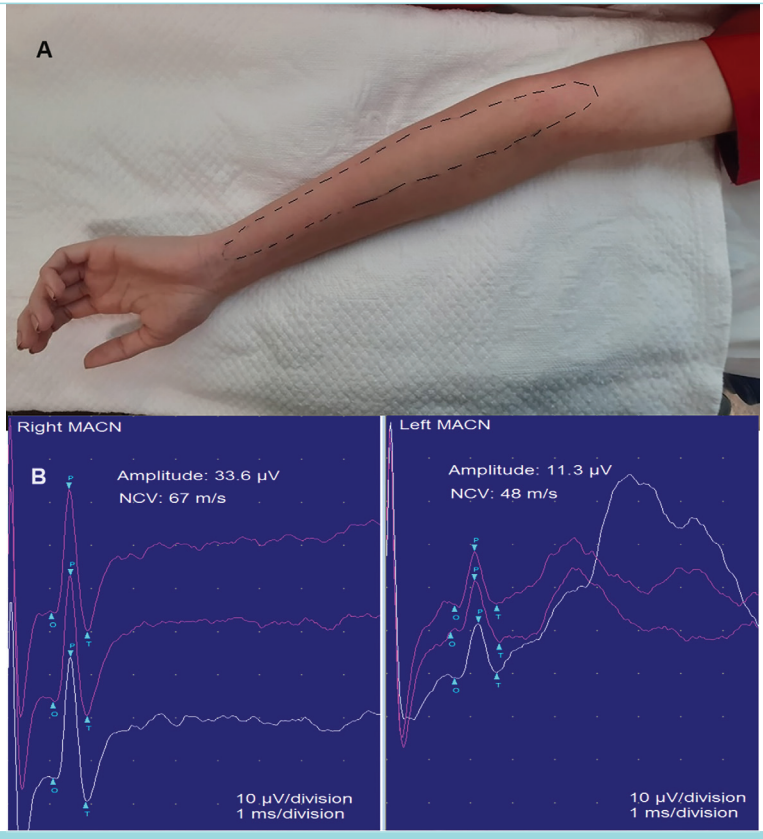

Figure 1. (A) Area of sensory abnormality in the patient's extremity. (B) The nerve conduction study of the medial antebrachial cutaneous nerve.
MACN: Medial antebrachial cutaneous nerve, NCV: Nerve conduction velocity.

DISCUSSION

Isolated injury to MACN is an uncommon condition. In this report, we present a rare case of MACN injury that occurred following venous blood sampling, with particular attention to the presence of neuropathic pain and the patient's BMI, both of which may have played a role in the development and persistence of symptoms.

MACN neuropathy may be caused by a neuroma or a lipoma.[3,6] In addition, MACN injury has been reported due to interventional procedures, or surgery involving the elbow region or antecubital fossa.[4,5,7] Horowitz[5] reported MACN injury in 5 of 11 patients with a peripheral nerve injury, which may be associated with routine venipuncture. In addition to arteries and veins, the MACN is also associated with the cubital fossa,[7] which means that the MACN may be damaged during invasive procedures in this region. In the present case, MACN injury developed during blood collection from the antecubital fossa. The immediate onset of pain and paresthesia may mean that the nerve is directly affected.[7] This condition, is well known in sciatic nerve injury due to intramuscular injection.[14] If the nerve is directly affected, the complaints begin immediately or within seconds. If fibrosis affects the nerve or a toxic substance affects the nerve through diffusion, the complaints may begin within hours/days.[7,14] Therefore, in the present case, it can be considered that the nerve is directly affected. In addition, previously reported cases indicate that neuropathic pain is a significant factor in MACN injury.[3-5,7] Similarly, the patient's LANSS score was above 12 and she had allodynia.

It may be important that the BMI of the patient was below 18.5 kg/m^2. It is known that low BMI may be a risk factor for sciatic nerve injury due to intramuscular injection.[14,15] This may be because thin people have less muscle mass protecting the sciatic nerve.[14,15] Similarly, it is thought that peroneal neuropathy at the head of the fibula associated with weight loss may be due to decreased peroneal nerve protective tissue.[16,17] In the present case, reduced protective tissue in the medial elbow region may have increased MACN vulnerability and contributed to nerve injury. In individuals with low BMI, the lack of subcutaneous fat may leave superficial nerves more exposed to external trauma. Similar mechanisms have been described in sciatic and peroneal neuropathies associated with low BMI.[14-17] Even routine procedures like venipuncture may pose a higher risk in such patients. In addition to BMI, factors such as the type of syringe used for blood collection, the angle of needle insertion, and the depth of penetration into the antecubital fossa may also play a critical role.[14] However, even with attention to these, anatomical variations can predispose to MACN injury.[7]

The nerve conduction study of the posterior branch of MACN was not performed. This can be considered a limitation of the report. Involvement of the posterior branch of the MACN may help localize the lesion, as simultaneous involvement of both anterior and posterior branches suggests a lesion proximal to the elbow region. In this case, the presence of sensory symptoms limited to the area innervated by the anterior branch, with no sensory changes in the region supplied by the posterior branch, supports the conclusion that the injury was caused by the venipuncture procedure. The absence of ultrasonography (USG) as an imaging method in this case may also be considered a limitation for diagnosing MACN injury. USG can offer certain advantages over MRI in visualizing peripheral nerves.[18] However, the small caliber of the MACN and its close proximity to surrounding soft tissue structures may reduce its diagnostic utility in such cases.[18] Although USG was not employed in this case, it is important to note that X-ray and MRI effectively ruled out other potential etiologies, such as fractures, hematoma, and edema. X-ray was preferred initially to rule out structural causes such as bone lesions or fractures, as it was more readily available in the clinical setting. Despite these limitations, this case offers two notable contributions to the literature. First, it highlights the occurrence of neuropathic pain following isolated MACN injury, rarely been emphasized. Second, it raises the possibility that low BMI may serve as an anatomical risk factor for such injuries. Future studies examining the association between MACN injury and BMI may help identify patient-related risk factors for nerve injury following venipuncture. Additionally, research focusing on neuropathic pain in cases of MACN injury may help clarify the underlying mechanisms.

CONCLUSION

The delayed referral and absence of early neurological assessment in this case, reflect the possibility that such injuries may initially be underrecognized. Increased clinical vigilance is essential, especially when patients report immediate pain and paresthesia during venipuncture. In conclusion, this case highlights the need for greater caution during venipuncture in the antecubital fossa, particularly in patients with low BMI, as they may be more susceptible to MACN injury. Additionally, neuropathic pain can be a presenting symptom in such cases.

MAIN POINTS

- Medial antebrachial cutaneous nerve (MACN) injury can occur following routine venous blood collection, particularly in the antecubital fossa.
- Patients with low body mass index may be at increased risk for MACN injury due to reduced soft tissue protection.
- Neuropathic pain, including allodynia and sensory deficits, can be a prominent and persistent symptom of isolated MACN neuropathy.

ETHICS

Informed Consent: Written informed consent was received from the patient.

Footnotes

Authors Contributions

Surgical and Medical Practices: H.F., S.M.B., H.C.A., Ç.K., Concept: H.F., S.M.B., H.C.A., Ç.K., Design: H.F., S.M.B., Data Collection and/or Processing: H.F., S.M.B., H.C.A., Ç.K., Analysis and/or Interpretation: H.F., S.M.B., H.C.A., Ç.K., Literature Search: H.F., S.M.B., H.C.A., Ç.K., Writing: H.F., S.M.B., H.C.A., Ç.K.

DISCLOSURES

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