

Median nerve compression caused by superficial brachial artery: an unusual clinical case

Journal of International Medical Research

48(12) 1–5

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DOI: 10.1177/0300060520969043

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Abstract

An iatrogenic pseudoaneurysm of the radial artery and spontaneous venous malformation are associated with median nerve compression. However, the superficial brachial artery (SBA) has rarely been described as the cause of neurological deficits due to median nerve compression. A 61-year-old man was admitted to our clinic with a 1-year history of intermittent aching palsy in the left thumb that had progressed to the first three fingers. Clinical examination revealed mild sensory disturbance and hyperpathia in the first three fingers and weakness of the opponens pollicis. Ultrasound and magnetic resonance imaging confirmed that the SBA was compressing the median nerve by almost one-third. When anomalies of the SBA impinge on the median nerve, pulsatile pressure is applied to the nerve trunk. This may trigger ectopic stimulation of sensory fibers, leading to severe pain, sensory neuropathy, and motor disturbance. Considering the substantial difficulties and risks of a surgical operation as well as the patient's wish to undergo conservative treatment, we performed muscle relaxation and acupuncture to relieve the pressure of the surrounding soft tissue and in turn decrease the impingement of the SBA on the median nerve. A satisfactory treatment effect was reached in this case.

Keywords

Median nerve, superficial brachial artery, case report, nerve compression, neurologic deficits, conservative treatment

Date received: 28 July 2020; accepted: 5 October 2020

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Introduction

The radial artery shows a high degree of variability in its origin, course, arrangement of the radial recurrent artery, and contribution to vascularization of the hand.^{1,2} Adachi³ first defined the superficial brachial artery (SBA) as the brachial artery that runs over the surface of the median nerve (MN). In one study involving dissection of the arms of 304 Korean cadavers, the incidence of the SBA was approximately 12.2%.⁴ The SBA gave rise to the radial artery and ulnar artery in the cubital fossa (8.9%), persisted in the forearm in the form of the radial artery (2.3%), or terminated in the upper arm (1.0%).⁴ Although there are many forms of SBA anomalies, all are closely related to the MN.⁵ The SBA can occasionally cause MN compression and resultant symptoms, and this condition usually requires surgery. We herein report a case of MN compression by the SBA and discuss the possibility of delaying surgical exploration.

Case report

A 61-year-old man was admitted to our clinic with a 1-year history of intermittent

aching palsy in the left thumb that had progressed to the first three fingers. He reported that he easily dropped items after clutching them.

Clinical examination revealed mild sensory disturbance and hyperpathia in the first three fingers. With the exception of weakness of the opponens pollicis, there was no motor weakness or swelling in either hand, and there was no evidence of any vascular obstruction. Tinel's sign was negative.

Color Doppler ultrasonography of the left upper limb confirmed that the MN of the left elbow traveled behind the brachial artery and was locally compressed (Figure 1). Electromyography showed slow conduction velocity and low amplitude in both the MN and ulnar nerve. Magnetic resonance imaging of the left upper limb ruled out compression and swelling of the brachial plexus and nerve roots (Figure 2), and magnetic resonance angiography showed changes in the brachial artery (Figure 3).

Because of the special relationship between the brachial artery and the MN, the risk of a surgical operation is greatly increased. The patient in the present case was also resistant to surgery. Considering that his symptoms were mild and his



Figure 1. The median nerve of the left elbow was partially moved behind the radial artery (marked at the surface of the body) and partially compressed. A, median nerve; B, brachial artery.

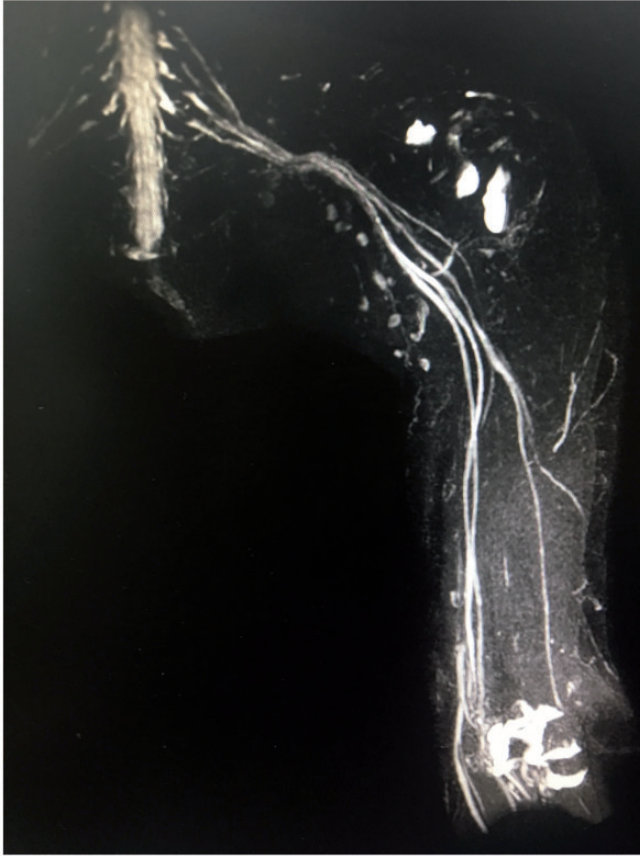


Figure 2. The brachial plexus and nerve roots were not compressed or swollen.

neurological impairment was not serious, we implemented temporary conservative treatment consisting of muscle relaxation, acupuncture, and moxibustion. After 2 months of conservative treatment, the patient's numbness symptoms had substantially improved. We advised him to avoid physical labor. After 1 year of follow-up, the patient's symptoms had not recurred.

Discussion

Anatomical locations that are prone to nerve interception include locations at which nerves pass through fibro-osseous or fibromuscular ducts and penetrate muscle.⁶ Therefore, MN compression by

ligaments and muscle fascia is common; however, compression by vascular abnormalities has rarely been reported. Only a few cases of an aneurysm causing MN compression have been reported.⁷⁻⁹ Such patients often require surgical treatment. In the present case, symptomatic MN compression was caused by the SBA. To our knowledge, this is the first report of this situation.

When it occurs, the SBA may completely replace the brachial aorta, or it may be accompanied by an equally important, more important, or less important brachial artery as deep as the MN.¹⁰ Its presence can be best understood by revisiting the normal development of the upper limb arterial



Figure 3. The arrow shows the superficial brachial artery.

pattern. The SBA first appears in 21-mm-long stage 4 embryos. The SBA develops in the axillary area and crosses the inside of the arm. It descends from the ulnar side to the radial diagonal of the forearm and reaches the posterior surface of the wrist joint. Here, the SBA divides the wrist bone into branches on the dorsal side of the thumb and index finger.¹¹ Many other minor variations also exist.

Our patient developed numbness and pain of the left thumb, middle finger, and index finger as well as atrophy of the *opponens pollicis* muscle. He had been previously diagnosed with nerve root cervical spondylosis and received corresponding treatment, but his symptoms were not

relieved. We performed a thorough clinical examination of the patient. The cervical magnetic resonance imaging findings did not support the diagnosis of cervical spondylosis radiculopathy. Magnetic resonance imaging of the brachial plexus also excluded trauma and a tumor of the brachial plexus.

We finally used ultrasonography to examine the brachial plexus and found that the patient's symptoms were being caused by MN compression. The ultrasound images showed that the SBA was compressing the MN by almost one-third. When anomalies of the SBA impinge the MN, pulsatile pressure is applied to the nerve trunk. This may trigger ectopic stimulation of sensory fibers, leading to severe

pain, sensory neuropathy, and motor disturbance. Considering the substantial difficulties and risks of a surgical operation as well as the patient's wish to undergo conservative treatment, we used muscle relaxation and acupuncture to relieve the pressure of the surrounding soft tissue. This in turn helped to decrease the impingement of the SBA on the MN. After 2 months of treatment, the patient's neurological function had returned to near normal levels.

Conclusion

The SBA may be a potential cause of MN compression. This may help to explain the cause of idiopathic MN neuropathies. The role of conservative treatment for such diseases cannot be ignored.

Declaration of conflicting interest

The authors declare that there is no conflict of interest.


Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Ethics statement

All of the patient's details have been de-identified in this article. Ethics approval was not required because this study only involved observation of the development of a single case and did not involve changes in conventional treatment. The patient provided verbal informed consent. No personal information is included in the case description; thus, written consent was not required. The patient agreed to receive all treatments.

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