

CASE REPORT

Aberrant Radial Artery Causing Carpal Tunnel Syndrome

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Abstract

Anatomical vascular variations are rare causes of carpal tunnel syndrome. An aberrant medial artery is the most common vascular variation, while an aberrant radial artery causing carpal tunnel syndrome is even more rare, with an incidence ranging less than 3%. This article reports a patient with compression of the median nerve at the carpal tunnel by an aberrant superficial branch of the radial artery.

An 80-year-old man presented with a 5-year history of right hand carpal tunnel syndrome; Tinel sign, Phalen test and neurophysiological studies were positive. Open carpal tunnel release showed an aberrant superficial branch of the radial artery with its accompanying veins running from radially to medially, almost parallel to the median nerve, ending at the superficial palmar arterial arch. The median nerve was decompressed without ligating the aberrant artery. At the last follow-up, 2 years after diagnosis and treatment the patient is asymptomatic.

Keywords: Aberrant radial artery, Carpal tunnel syndrome, Vascular variations

Introduction

Carpal tunnel syndrome is the most common entrapment neuropathy at the upper extremity. Thickening of the transverse carpal ligament is considered the most common cause (1). Vascular anatomical variations causing median nerve compression at the carpal tunnel are rare (1-9). An aberrant median artery is the most common, while an aberrant radial artery is a rare vascular variation causing carpal tunnel syndrome (5-9). This article reports a patient with carpal tunnel syndrome symptoms by an aberrant radial artery and discusses the clinical diagnosis and treatment for this entity.

Case Report

An 80-year-old man presented with a 5-year history of right hand carpal tunnel syndrome. He reported persistent night pain, clumsiness and numbness at the thumb, ring and median fingers. Clinical examination showed atrophy of the thenar muscles, a positive Tinel sign and Phalen maneuver, and hypoesthesia at the three radial fingers. Electromyography showed advanced right carpal tunnel syndrome with absent sensory and motor nerve potentials. Surgical decompression of the median nerve through open carpal tunnel surgery was recommended and a joint decision was obtained.

Under local anesthesia and humerus tourniquet, a straight incision was done lying parallel and just ulnar to the thenar crease, in line with the long axis of the ring finger. After division of the transverse carpal ligament, a bulky artery along with two accompanying veins was observed running from radially to medially, almost parallel to the median nerve [Figure 1]. Surgical exploration showed origin of the aberrant artery from the radial artery, approximately 1 cm above the wrist crease. The aberrant artery was passing below the transverse carpal ligament through the carpal tunnel, and it was ending at the superficial palmar arch. Decompression of the median nerve was done without ligation of the aberrant artery that was left intact running radially to the median nerve. The tourniquet was released; radial and ulnar pulses at the wrist were normal. Clinical symptoms resolved immediately the night after the operation; motor function recovered progressively during the following months. At the last follow-up, 2 years after diagnosis and treatment, the patient is asymptomatic without any evidence of persistent or recurrent carpal tunnel syndrome.

Discussion

Carpal tunnel syndrome is the most common peripheral

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Figure 1. Intraoperative photograph shows the median nerve (arrow) and an aberrant radial artery with two accompanying veins (arrow heads). The diameter of the vascular anomaly is almost equal to the diameter of the median nerve.

neuropathy. It is considered an entrapment neuropathy since symptoms occur due to median nerve compression at the carpal tunnel. Although the syndrome is mainly idiopathic, often it has been associated with age, gender, occupation, wrist injuries, metabolic conditions such as diabetes mellitus, and tumors, most common ganglia (2). Anatomical variations by abnormal embryological development are rare causes of carpal tunnel syndrome (6). The rates of anatomical variations as a cause of median nerve compression at the carpal tunnel range from 0.5% to 10% of all cases of carpal tunnel syndrome (3). Anatomical variations may be muscular, neural or vascular, and are usually unilateral (3-11).

Vascular anatomical variations causing median nerve compression at the carpal tunnel are rare (4-6). An aberrant median artery is the most common (4). Being the main blood supply to the hand during the

first trimester of development, it regresses later. When remaining at its primary position, it follows the course of the median nerve in the distal forearm, passing the wrist superficially to the carpal tunnel. Sometimes it may be related to bifurcation of the median nerve (4). Carpal tunnel syndrome secondary to an aberrant medial artery most commonly occurs secondary to thrombosis or aneurysm formation; in these cases, ligation of the aberrant artery is the treatment of choice (4).

An aberrant radial artery is a rare cause of carpal tunnel syndrome, with an incidence ranging less than 3% (5,6,8,9). Normally the last 5 cm of the radial artery, before the deviation of the branch to the palmar arch is referred as the distal radial artery (7). At the wrist, the superficial branch lies in close relation with the adductor pollicis brevis, before ending at the superficial palmar arch. When present, an aberrant radial artery supplies the thumb, radial half of the index finger and the thenar muscles (8,9). Its diameter of is nearly 2 mm. The diagnosis of an aberrant radial artery is difficult. A superficial aneurysm or the presence of Raynaud phenomenon may provide evidence for further examination of any wrist pathology (10, 11). MR imaging of the wrist or angiography of the forearm and hand are the imaging modalities of choice for the diagnosis of an aberrant artery. As in the present, an aberrant radial artery arises from the main radial artery and descends to the wrist from radially to medially, ending at the superficial palmar arch (8-11). Ligation of the artery should be avoided because of its blood supply to the thenar muscles and palmar arch, except in the case of large aneurysms (10).

In conclusion, vascular anatomical variations causing carpal tunnel syndrome are rare; an aberrant radial artery is an even more rare cause of median nerve compression at the carpal tunnel. Hand surgeons should be aware of the presence of an aberrant radial artery to avoid injury of the artery and damage to the arterial system of the wrist and hand.

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