

Received: 2010.01.19
Accepted: 2011.02.08

Thrombosed persistent median artery causing carpal tunnel syndrome associated with bifurcated median nerve: A case report

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Summary

Background:	Carpal tunnel syndrome is a sporadically occurring abnormality due to compression of median nerve. It is exceedingly rare for it to be caused by thrombosis of persistent median artery.
Case Report:	A forty two year old female was referred for ultrasound examination due to ongoing wrist pain, not relieved by pain killers and mild paresthesia on the radial side of the hand. High resolution ultrasound and Doppler revealed a thrombosed persistent median artery and associated bifurcated median nerve. The thrombus resolved on treatment with anticoagulants.
Conclusions:	Ultrasound examination of the wrist when done for patients with carpal tunnel syndrome should preferably include looking for persistent median artery and its patency
Key words:	Doppler ultrasonography • thrombosed persistent median artery • bifurcated median nerve • Carpal Tunnel Syndrome – diagnosis
PDF file:	http://www.polradiol.com/fulltxt.php?ICID=881822

Background

The carpal tunnel is bounded posteriorly by the arch of carpal bones and anteriorly by the transverse carpal ligament. The median nerve and long flexor tendons of the forearm course through it from the forearm to the palm. The median nerve lies superficial to the flexor tendons and beneath the transverse carpal ligament [1]. Conditions that crowd structures within the carpal tunnel such as tendosynovitis, ganglia, excessive fat or synovial hypertrophy may result in median nerve compression that may cause pain, paresthesia or sensory loss in the median nerve distribution and progressive atrophy of muscles of thenar eminence. This is known as the carpal tunnel syndrome and is the most common entrapment neuropathy [2].

Vascularity of the hand is extremely variable. A persistent median artery is one of the numerous documented variations [3,4]. A persistent median artery is present in approximately 10% of the population [5] and this anatomic variation is almost always asymptomatic. The thrombosis of that artery to cause acute carpal tunnel syndrome is exceedingly rare [6].

We report a case of thrombosed persistent median artery causing subacute carpal tunnel syndrome, which was associated with bifurcated median nerve. This abnormality was detected earlier before frank sonographic features of the median nerve compression developed. The symptomatology of patient improved on treatment with anticoagulants and the thrombosed artery recanalised.

Case Report

A forty two year old female presented to us for ultrasound examination of the wrist to rule out tendosynovitis. She suffered from ongoing pain of the wrist not relieved by pain killers. The patient also mentioned of mild paresthesia along the radial side of the hand.

High resolution ultrasound and Doppler examination revealed persistent median artery with thrombus in its distal part, presented as a segment with loss of signal flow combined with luminal dilatation (Figure 1). Dampened spectral flow pattern consistent with distal obstruction was seen in the proximal patent part of the artery

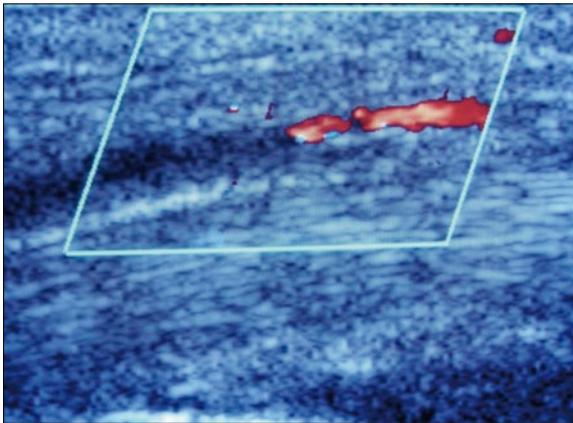


Figure 1. Longitudinal section of the persistent median artery with Colour flow mapping showing thrombus distally occluding the lumen which is mildly dilated, presence of flow is noted proximally.

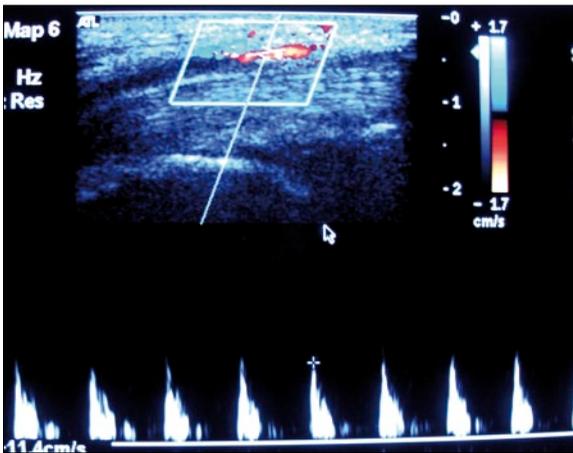


Figure 2. Pulse Doppler in the patent segment of persistent median artery showing dampened flow due to distal thrombus occluding the lumen.

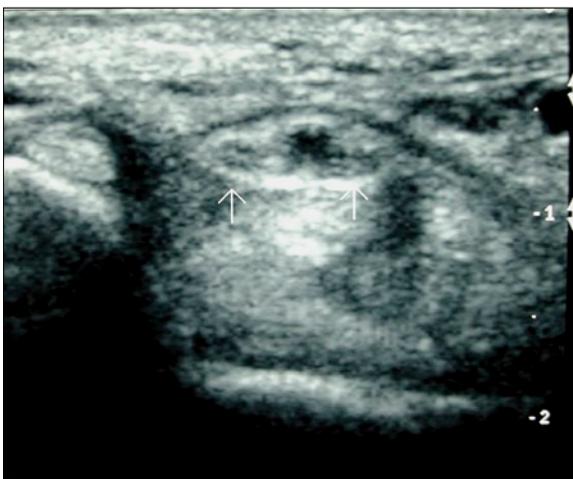


Figure 3. Cross section of the persistent median artery with bifurcated median nerve on its either side (arrows).

(Figure 2). Associated bifurcated median nerve was seen on both sides of the persistent median artery (Figure 3). The median nerve, otherwise showed normal thickness, no

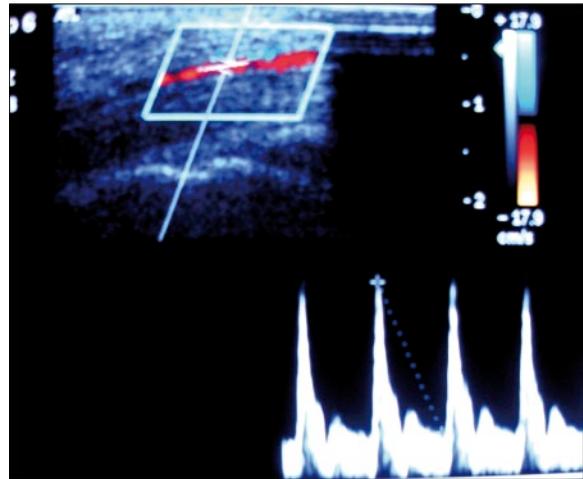


Figure 4. Pulse Doppler one week after anticoagulant therapy shows improving spectral flow pattern and velocities.

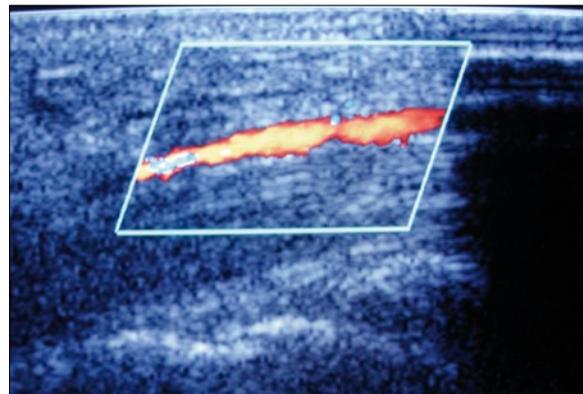


Figure 5. Longitudinal section of the persistent median artery with Colour flow mapping one week after the anticoagulant therapy shows filling of signal flow in the lumen and hence recanalisation.

hypoechoogenicity, thickening or loss of fibrillar pattern. The patient was put on anticoagulants and improved symptomatically. A follow up ultrasound and Doppler examinations after a week revealed recanalisation of the lumen and decrease in diameter of the affected segment of the median artery. There was also improvement in spectral flow pattern in the proximal part of the artery (Figure 4,5).

Discussion

The carpal tunnel syndrome is the most common entrapment neuropathy caused by compression of median nerve at the wrist, this may result from various reasons which reduce carpal tunnel capacity and those which enlarge the volume of the contents [3]. In milder cases patients present with paresthesia and pain in the area innervated by the median nerve. Weakness, atrophy of muscles of the thenar eminence and persistent hypoesthesia is seen in severe cases [2].

McCormack and co-workers in their detailed study of anatomical variations of arteries of forearm found the presence of persistent median artery in 4.5% of cases [1]. The axial artery of the upper limb first gives rise to the median

artery, this however involutes when the radial and ulnar arteries differentiate. The persistent median artery usually arises proximally from either the ulnar or anterior interosseous artery in the upper forearm [7].

Bunnell, in 1957, was the first to suggest that persistent median artery may be the cause of median nerve compression [8]. Probably pressure from the thrombosed artery rather than ischemia is the mechanism, especially as the artery and nerve share a common sheath [6,7,9]. Barfred et al stated that persistent median artery as such gives no symptoms [9]

Causes such as infection of deep facial planes due to cut wound [1], frequent bicycle riding with wrist placed in unusual position [2], trauma [3], stiff clutch of motorcycle [7], hormonal contraceptive pills, screwdriver usage [9], excessive housework [6] have been found to cause thrombosis of median artery. In our case the patient admitted to

heavy repeated floor scrubbing before the onset of symptoms, on follow up after a few months she is symptom free and has stopped scrubbing floors.

Early detection of the thrombosed median artery in our case helped start early anticoagulant therapy, thus preventing the need for any surgery or thrombolytics. Unlike the usual acute carpal tunnel syndrome [2,3] seen in thrombosed median artery, our patient had subacute presentation with clinical features which pointed to diagnosis of carpal tunnel syndrome at the stage when the median nerve thickening had still not developed. It is hence advisable to also look for persistent median artery which might be thrombosed in addition to other causes of carpal tunnel syndrome. Early medical therapy in our case helped to prevent surgery, which may be excision of the thrombosed segment of the artery[2] or the artery may be dissected and moved away from the nerve [3,6,9].

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