Persistent median artery thrombosis: a rare cause of carpal tunnel syndrome

Abstract

Background: Carpal tunnel syndrome (CTS) is a sporadic event with compression of the median nerve (MN). Persistent median artery (PMA) thrombosis is an exceptionally rare cause of CTS.

Case report: 38-year-old male presented with acute on subacute right wrist pain with positive Tinel's sign. An ultrasound and computed angiography study confirmed a PMA with thrombosis. The patient was treated with intravenous heparin then discharged home on enoxaparin and warfarin crossover.

Discussion: PMA can lead to CTS by compression from the adjacent median nerve. Thrombosis of the PMA can also lead to CTS. Surgical intervention is needed in cases of severe CTS. Carpal tunnel release is usually successful. Excision of the PMA can risk vascular compromise of the digits. Ultrasound is excellent for detecting rare causes of CTS.

Conclusion: Ultrasound examination for CTS should include search for PMA and associated anatomical variations.

Keywords: carpal tunnel syndrome (CTS), median nerve, persistent median artery (PMA), thrombosis (MN).

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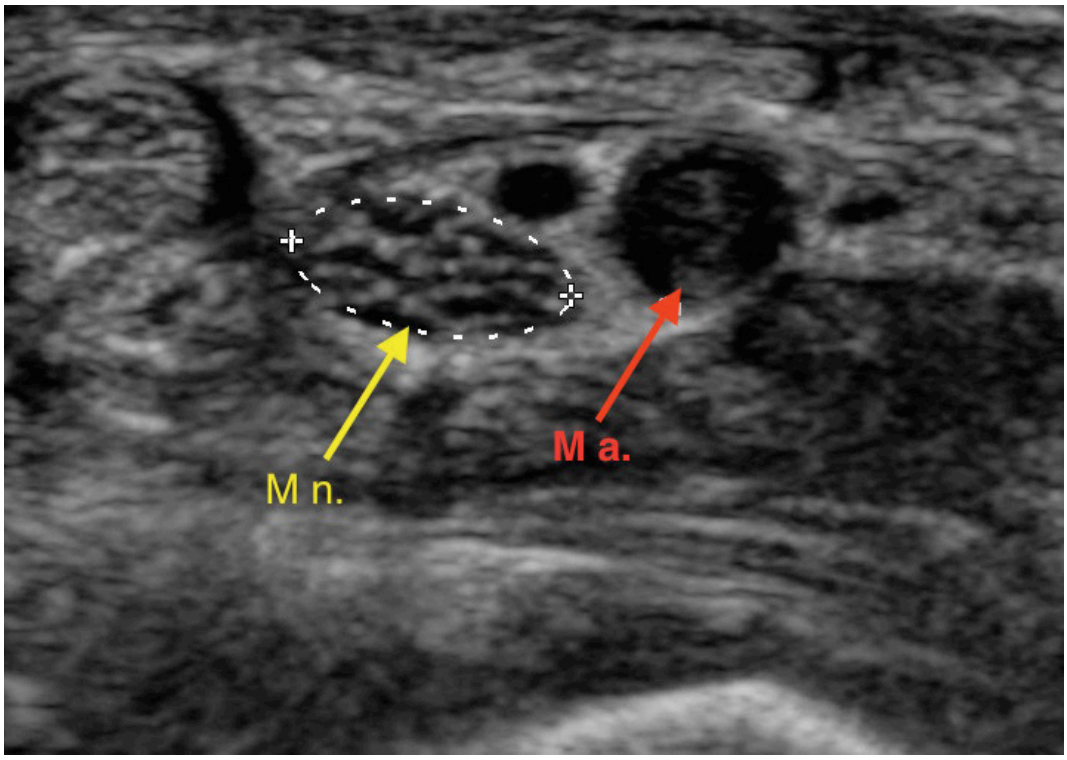

Figure 1: Median artery (red arrow) and median nerve (yellow arrow).

Background

Carpal tunnel syndrome (CTS) is commonly a compression neuropathy of the median nerve. Generally patients present with neuropathic pain in median nerve distribution, nocturnal paresthesia and in severe cases, loss of motor function and atrophy of the thenar muscles.[1–3] Common aetiologies of CTS include trauma, ganglion cysts, proliferative synovitis, muscular anomalies, tumours and rarely aberrant vascular structures.[2,4,5] Doppler examination is an excellent tool to evaluate whether PMA is present, detect possible thrombosis and to determine whether it is essential to digital blood supply of the hand.[5–8]

Case report

A 38-year-old male presented to the emergency department with three-week history of right palm pain, which had acutely gotten worse. He reported small amount of trauma to the right

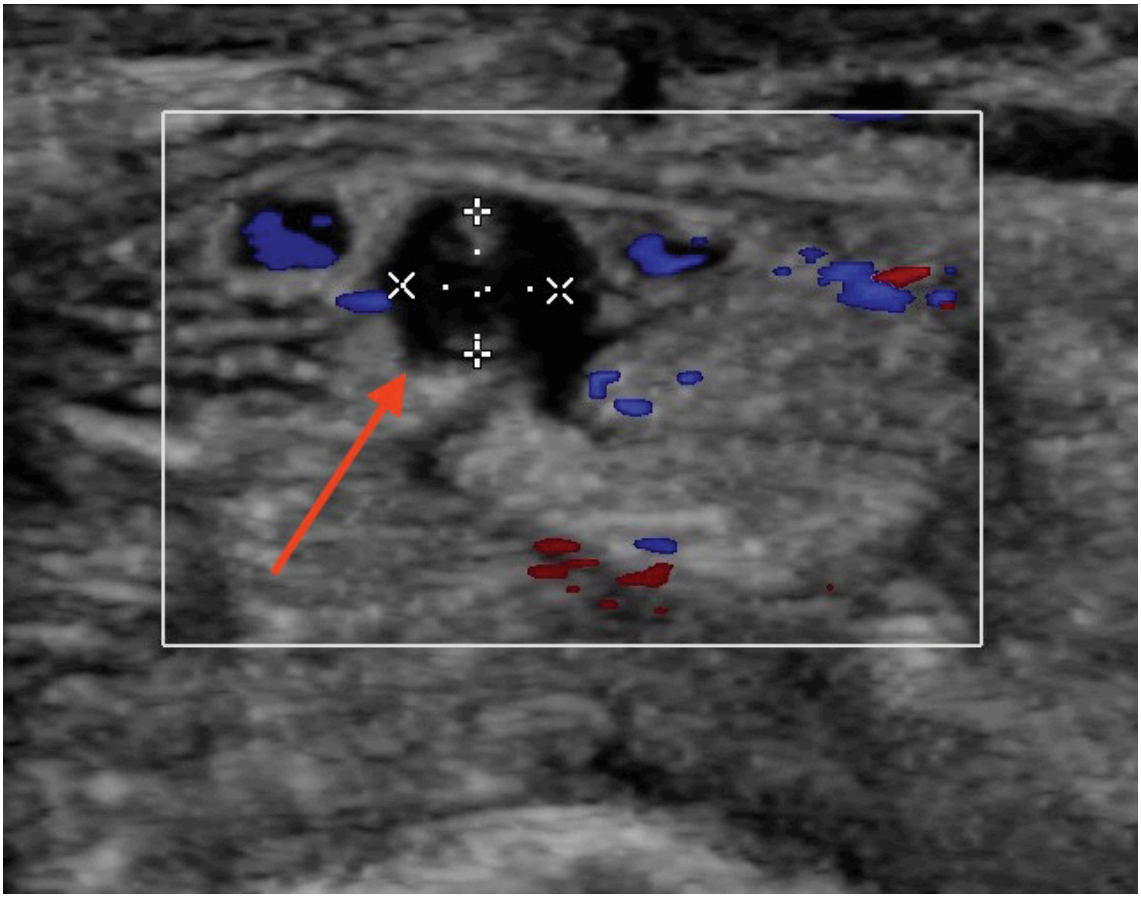

Figure 2: Absence of blood flow in the median artery (red arrow).

Figure 3: Thrombus in a long segment of the persistent median artery (red arrow).

wrist one month ago while lifting a heavy object. He had no co-morbidities and was not on any regular medications. On examination, he had a mildly tender right wrist and a positive Tinel's sign. There was no swelling of the wrist or hand and no atrophy of the thenar muscles.

A high frequency (12MHz) ultrasound examination revealed a PMA adjacent to the MN travelling through the carpal tunnel with an echogenic structure across the lumen (Figure 1).

Doppler showed absence of blood flow (Figure 2) across a long segment of the PMA confirming the presence of a thrombus (Figure 3).

The findings were correlated with a 64 slice computed

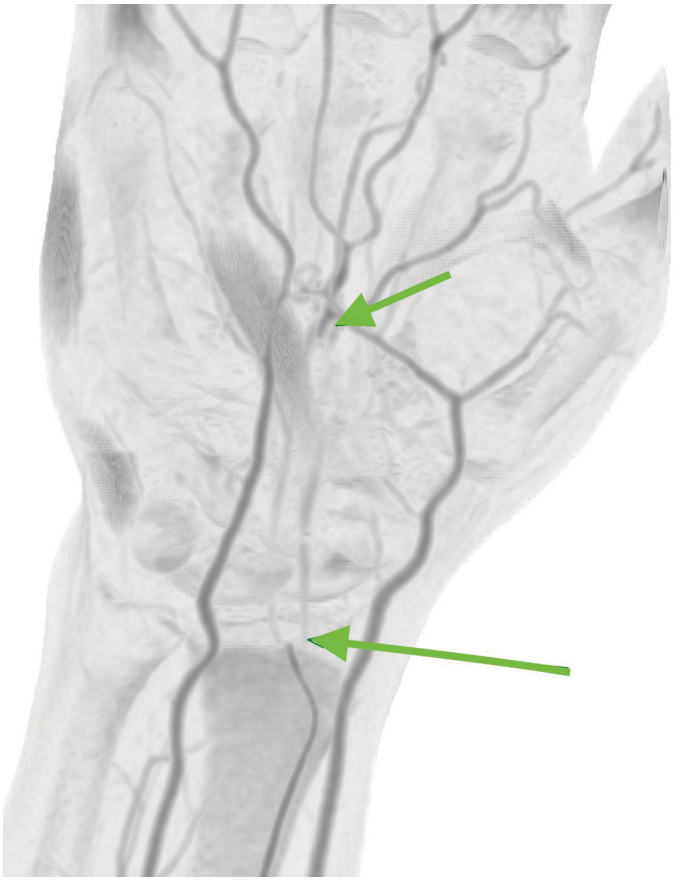

Figure 4: CT angiography correlation of PMA occlusion in antero-posterior view (green arrows).

tomography (CT) angiography procedure of the right hand and wrist using intra-venous (IV) contrast (Figure 4 and 5).

The patient was treated with IV heparin and then discharged home on crossover enoxaparin subcutaneous injections with warfarin orally. He was followed up in clinic four weeks later with marked improvement in symptoms.

Discussion

The carpal tunnel is the deep space of the transverse carpal ligament. The transverse carpal ligament extends medially (ulna) from the hook of hamate and the pisiform to the scaphoid and trapezium laterally (radius). The carpal tunnel is bounded posteriorly by the carpal bones and anteriorly by the flexor retinaculum.[9] Traditionally, the carpal tunnel consists of the median nerve (MN), four flexor tendons of flexor digitorum profundus (FDP), four flexor tendons of flexor digitorum superficialis (FDS), and flexor pollicis longus (FPL) tendon.[6,10,11]

The median artery typically regresses into a small artery after the eighth week of gestation and accompanies the MN as the arteria comitans nervi median.[1,4,5] Occasionally the persistent median artery (PMA) passes through the carpal tunnel of the wrist, accompanying or sometimes piercing the MN.[12] Lisanti *et al*, Roll *et al* & Kele, *et al.* also report bifurcation of the MN with the PMA lying in between. The incidence of the PMA has been reported by a few studies and is quite variable: 10–50%,[10] 4%[12] and 1.5–27%[11] and dependent on populations.[11,12]

Fumiere, *et al.* describe that in patients with patent PMA,

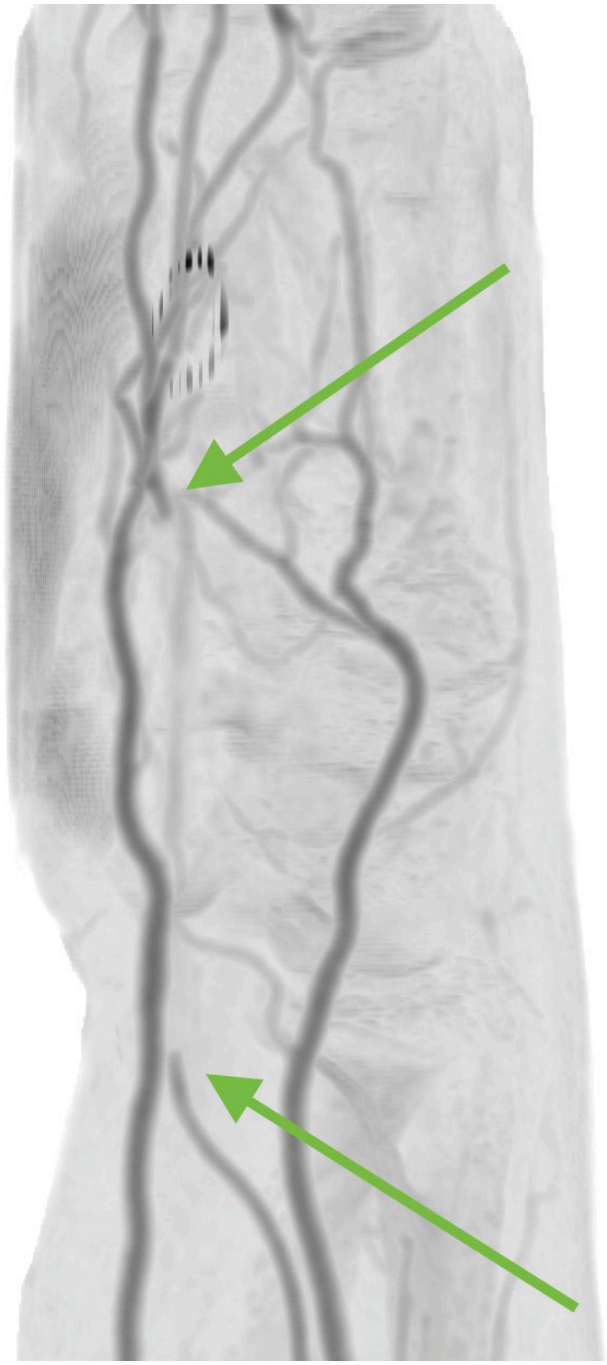

Figure 5: CT angiography correlation of PMA occlusion in lateral view (green arrows).

physical activity can cause CTS. The PMA is also at risk of thrombosis[2,3,5] or intraluminal calcification,[10] which can lead to CTS. Patients with significant symptoms of CTS can be treated surgically with carpal tunnel release.[12] Barfred, *et al.* recommend that if the vessel is thrombosed, it should be resected. In our case, however, the patient was treated conservatively due to a relatively long course of mild symptoms and good results from medical treatment. Excision of the artery is generally avoided because of risk of vascular compromise to the digits.[13,14]

Ultrasound is an excellent examination for diagnosing rare causes of CTS including the presence of PMA with or without thrombosis.[2–5,9,11] Ultrasound can also help delineate whether a bifid median nerve is present.[11]

Conclusion

The value of Doppler ultrasound in diagnosis of uncommon and rare causes of CTS is emphasized. Ultrasound of the wrist should include search for a PMA and other associated anatomical variations.

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