Persistent median artery: A sign of primitive arterial pattern

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Abstract
Introduction
Persistent median artery in a human adult shows primitive arterial pattern in the forearm. It usually involutes before birth. This paper reports a case of a persistent median artery.

Case report
We came across persistence of left median artery during dissection. We also observed absence of superficial palmar arch in the left hand. Median artery mainly supplied index and middle fingers. Presence of this artery may be a causative factor for carpal tunnel syndrome. Various procedures like modified Allen’s test, Doppler ultrasound and angiography can be implemented to trace the arterial flow.

Conclusion
Although median artery is not so uncommon, its persistence may result in compression syndrome of median nerve. It can be considered as an 'emergency vessel' supplying the hand in case of radial and ulnar artery injuries.

Introduction
The median artery is the artery of the forearm that accompanies the median nerve in the carpal tunnel when it persists. It develops from the axial artery, which represents brachial, anterior interosseous arteries; the median and anterior interosseous arteries are the main sources of blood supply to the hand during the first trimester of gestation. After the eighth week of gestation, radial and ulnar arteries develop and are solely responsible for blood supply to the forearm and hand as the median artery regresses. Pecket claimed three different types of median nerve vascularisation: (a) radial and ulnar arteries forming superficial and deep palmar arches with the median nerve supplied by superficial palmar arch and by the anastomoses formed by radial and ulnar and by the forearm muscular branches (70%). (b) Either trifurcation of brachial artery into radial, ulnar and median artery or bifurcation of brachial into the radial and ulnar arteries. The median artery travels superficially to the median nerve and branches out at the palm to feed second, third and fourth digits (10%). (c) The median artery is related with the superficial palmar arch (20%) ². Although the existence of the median artery is not so uncommon, ranging from 1.5 to 27.1% ³, ⁴, its survival in human adults shows the primitive arterial pattern. This paper shows a sign of primitive arterial pattern in the persistent median artery.

Case Report
A persistent median artery was incidentally encountered in the left forearm during dissection. The median artery was branching out from the common interosseous artery. We observed a different arterial pattern in the forearm. Brachial artery was dividing into three branches in the cubital fossa, namely radial, ulnar and posterior interosseous arteries. Posterior interosseous was running deep into the interosseous membrane, whereas the ulnar artery provided a very small trunk of common interosseous artery, which in turn branched into anterior interosseous and median arteries (Figure 1).

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Figure 1: Cubital fossa: Trifurcation of brachial artery (BA) into radial (RA), ulnar (UA) and posterior interosseous arteries (Pi). Red spot showing a minute trunk of common interosseous artery which is bifurcating into anterior interosseous (Ai) and median artery (MA).

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Anterior interosseous covered its course along with the anterior interosseous nerve in front of the interosseous membrane. The median artery was supplying the median nerve, running deep and trapped by the median nerve forming a neurovascular bundle. We separated the median artery from the median nerve for clear visualisation (Figure 2). We did not observe any superficial arch in the hand (Figure 3). The median artery entered the hand after passing through the carpal tunnel and supplied the index and middle fingers. The thumb was fed by radial artery, whereas the fourth and fifth digits were fed by the ulnar artery. All neurovascular structures were carefully cleaned and photographic documentation of anatomical landmarks was done.

**Discussion**

Persistence of the median artery in a human adult is a sign of primitive arterial architecture. Its existence is not uncommon and has been reported in previous literatures. A case reported by Georgiev et al. revealed the origin of the median artery at the same level as the common interosseous artery. It entered the hand and prolonged as artery princeps pollicis and provided cutaneous branches to the thumb and the index finger. A Doppler ultrasound revealed the persistent median artery in a 39-year-old man with the onset of cramping pain in the left index and middle fingers. Angiography in a postoperative case confirmed the presence of median artery on the ulnar side. A cadaveric study showed the origin of the median artery from the radial artery in the forearm, which later on participated in the formation of the superficial palmar arch. The present study showed rare findings: trifurcation of the brachial artery into the radial, ulnar and posterior interosseous; persistent median artery arising from the common interosseous artery; and absence of the superficial palmar arch.

Persistent median artery, aneurysm and thrombosis may develop carpal tunnel syndrome (CTS) resulting in compression of the median nerve. As described by Dickinson and Kleinert, calcification may also cause CTS in patients with renal failure. A thrombosed median artery causing CTS should be removed surgically without causing further vascular crisis and if the artery is pulsating and of considerable size, it can be saved and separated from the median nerve. Approximate incidence of persistent median artery causing CTS has been reported as 1.8–6%. Persistent median artery has been correlated with the anterior nerve syndrome characterised by paralysis of flexor pollicis longus, flexor digitorum profundus of the index and middle fingers and pronator quadratus. Persistence of the median artery shows the palmar pattern as the retention of embryonic pattern.

**Conclusion**

Although median artery is not so uncommon, its persistence may result in compression syndrome of median nerve. It can be considered as an ‘emergency vessel’ supplying the hand in case of radial and ulnar artery injuries. This artery may be used for grafting purpose elsewhere in the body.

**Figure 2:** Forearm: Median artery (MA) was separated from median nerve (MN).

**Figure 3:** Hand: Absence of superficial palmar arch.
Abbreviations list
CTS, carpal tunnel syndrome.

References