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## Case Report

### Superficial palmar arch with Persistent median artery

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#### ABSTRACT

During the routine cadaveric dissection of the upper extremities at the Department of Anatomy of Ahvaz Jundishapur University of Medical Science, one cadaver was found to have Persistent Median Artery (PMA) in the Carpal Tunnel. The PMA in present cadaver was as large as the radial artery originated from the brachial artery and ran distally, passed under the flexor retinaculum. The PMA involved in formation of radio-medio-ulnar type of superficial palmar arch (SPA). Although this type of SPA occurs very rarely, damage can affect the arterial supply of the fingers. This data could provide information for vascular surgeons harvesting PMA or a radial artery for coronary artery bypass grafting.

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## 1. Introduction

Neural, vascular, tendinous and muscular anatomical variations in the hand are frequent. Knowledge of these variations is important during hand surgical procedures such as arterial repairs, vascular graft applications.<sup>1</sup>

The median artery is a transitory vessel during early embryonic life and after the 8th week of gestation, is normally regressed by undergoing apoptosis to become as the artery comitans nervi median. PMA categorized into antebrachial and palmar patterns. Palmar PMA is large, long artery, pass through the carpal tunnel and reaches the palm.<sup>2</sup> Several structures such as the median nerve and tendons of the muscles of the forearm (flexor pollicis longus, flexor digitorum profundus, and flexor digitorum superficialis muscles) pass through the carpal tunnel. Carpal tunnel syndrome occurs when the median nerve of the wrist is compressed by the carpal flexor retinaculum.<sup>3</sup> The syndrome is a painful progressive condition with burning sensation or numbness of the first three fingers and some muscle atrophy. Carpal tunnel syndrome can be associated with any condition such PMA as that causes pressure on the median nerve at the wrist which leads to compressive neuropathies.<sup>3</sup>

The superficial palmar arch (SPA) as a dominant vascular structure of the palm is located superficial to flexor tendons. Classical type of SPA is formed predominantly by direct continuity between the superficial branch of the ulnar artery (UA) and superficial palmar branch of the radial artery (RA). Palmar digital arteries arise from the SPA. The SPA has been classified into complete and incomplete types based on the presence or absence of a communication between the constituting of UA and RA or the possible formation from a single UA and RA.<sup>4</sup>

The PMA can be involved in the construction of the SPA with RA, UA as radio-medio-ulnar type of SPA. The incidence of this type of the SPA in different populations is not yet known.

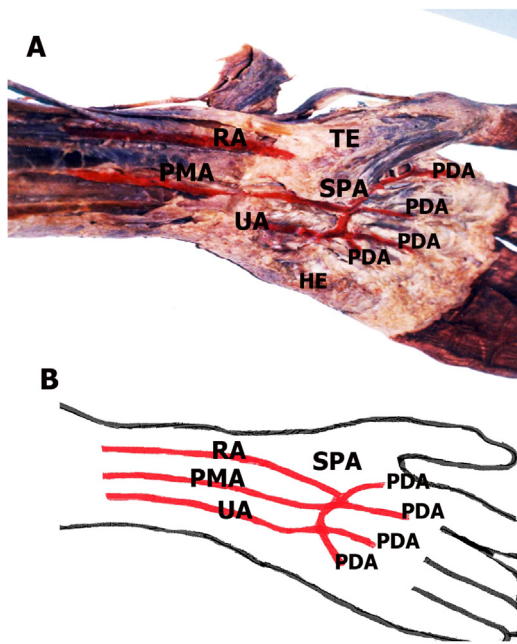
In this article, we describe a case of Palmar PMA passing in the carpal tunnel to formation of radio-medio-ulnar type of SPA. Knowledge of the rare type of SPA is important for the surgical interventions

## 2. Case report

During the routine cadaveric dissection of the upper extremities at the Department of Anatomy of Ahvaz Jundishapur University of Medical Science, we encountered a persistent median artery in the left upper extremity of a male cadaver. Upper extremities were dissected and were investigated for the presence of median artery and a possible involvement in the construction of the SPA. PMA was traced from origin to termination. In the present cadaver, normally brachial artery divides into its terminal branches

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**Fig. 1.** A: The palmar type of median artery originating from the brachial artery of upper limb. Cadaveric hand exhibiting the radio-medio-ulnar type of SPA. B: Pattern of PMA contribution to SPA. HE, hypothenar eminence; PMA, Persistent median artery; RA, radial artery; TE, thenar eminence; UA, ulnar artery; SPA, Superficial palmar arch; PDA, palmar digital arteries.

namely RA and UA at the cubital fossa. Dissection of the left upper limb showed a PMA as large as the radial artery originated from the brachial artery (Fig. 1). The PMA ran distally and passed under the flexor retinaculum. PMA anastomosed with the SPA. The SPA was complete and originated from three arteries; RA, UA and PMA as radio-medio-ulnar type of SPA that gave four palmar digital arteries; proper palmar digital artery and three common palmar digital arteries, which pass to the medial three interdigital clefts.

### 3. Discussion

In this study, PMA as large as the RA originated from brachial artery and involved in the SPA formation in the palm. PMA accompanies the median nerve along its course in the forearm. A large PMA can be associated with several clinical condition such as anterior interosseous nerve syndrome, pronator syndrome and carpal tunnel syndrome which leads to compressive neuropathies.<sup>5</sup> Therefore, awareness of anatomical variations of PMA is important while surgical procedures are performed in hand. Regarding origin, most of the PMA originated in the common

interosseous artery and anterior interosseous artery<sup>6</sup> and only 3.8% of PMA originated from brachial artery. The frequencies of the PMA in cadaveric studies vary from 2 to 8%.<sup>7–9</sup> Other studies report PMA in the carpal tunnel in 4% of 50 dissected upper limbs.<sup>10</sup> In Southern African cadavers, the incidence was as high as 27.1%.<sup>11</sup> PMA in the present study classified as palmar type which was large, long artery, and reached the palm<sup>2,12</sup> and involved in the construction of radio-medio-ulnar types of SPA.<sup>13</sup> Studies indicated that palmar type of median artery is found at a higher incidence than the antebrachial type.<sup>8</sup> Four common digital arteries raised for supply the second, third, and fourth web spaces of hand. The frequencies of this type of SPA vary from 1.2 to 6% and is the least common types among all the types of SPA investigated by various authors.<sup>4,14,15</sup> Taken together, although this type of SPA occurs very rarely, damage can affect the arterial supply of the fingers. Therefore, it is necessary surgeons and clinicians should be aware of such an SPA variation to do the investigations like Allen test, angiography and color Doppler studies of the hand before doing any invasive procedures on the hand. This data could provide information for vascular surgeons harvesting PMA or a radial artery for coronary artery bypass grafting.

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