A superficial artery may be present in the forearm, arising from the axillary, brachial or superficial brachial arteries and crossing over the origin of the flexor muscles of the forearm to reach the palm (Adachi, 1928; Bergman et al. 1988). When this superficial artery continues as the normal ulnar artery accompanying the ulnar nerve at the wrist, it is referred to as the superficial ulnar artery, with an incidence of ~4%. When the artery passes below or superficial to the flexor retinaculum in the middle of the forearm, sometimes continuing to join the superficial palmar arch, it is called the superficial median artery, with an incidence of ~1%. We have observed a relatively rare variation involving the presence of a superficial median artery in both upper limbs. We discuss the clinical importance and the developmental aspects of this arterial variation.

Superficial median arteries (SMA) were found in both the right and left upper limbs of a 94-y-old Japanese female who died of renal failure. The arteries were discovered during routine dissection for medical students.

In the right upper limb (Fig. 1a, b) the axillary artery did not pierce the brachial plexus, but descended medial and inferior to the brachial plexus and ran distally medial and superficial to the median nerve, a relationship referred to as Adachi type C (Adachi, 1928) in Japan. The brachial artery (8 mm in diameter) divided into radial and ulnar arteries (7 mm and 6 mm in diameter, respectively), 54 mm distal to the lower margin of latissimus dorsi. The radial artery passed distally superficial and medial to the median nerve and, at the level of a line between the medial and lateral epicondyles, branched to form the SMA (5 mm in diameter). The radial artery continued along its normal course in the forearm and reached the palm to form the deep palmar arch without the branch from the ulnar artery. The SMA pierced the bicipital aponeurosis, running distally and medially, superficial to pronator teres and flexor carpi radialis under the subcutaneous venous system and along the lateral side of palmaris longus. At the wrist, the SMA crossed under palmaris longus from lateral to medial and passed through the carpal tunnel with the median nerve to reach the palm. Since an anastomosis between the SMA and the ulnar artery was not present, a complete superficial palmar arch was not formed; a complete deep palmar arch was formed by the deep branch of the ulnar artery and the radial artery.

We could not find muscle branches either from the right or the left SMA. Moreover, an additional variation of the profunda brachii artery was observed in both arms, arising from the posterior circumflex humeral artery which in turn originated from the subscapular artery.

The ansa, consisting of the medial and lateral roots of the median nerve of the brachial plexus, was not formed on either side. Anterior divisions of the superior, middle and inferior trunks fused into a single cord, which then divided into the musculocutaneous, median and ulnar nerves. Thus the medial and lateral cords were not formed. This pattern of the brachial plexus is observed with incidences of 1.7% (3/175 arms; Kerr, 1918) and 2% (4/200 arms; Hirasawa, 1931).

We have encountered 2 arms with SMAs out of 200 arms dissected in a gross anatomy course between 1996 and 1998, an incidence of 1%. Incidences of SMA reported by other authors are 0.7% (8/1198 arms) by Adachi (1928), 1% (2/200 fetus arms) and 0% (0/100 adult arms) by Müller (1903), and 0% (0/750 arms) by McCormack et al. (1953). Compared with those reported for the superficial ulnar artery at 0.7% (8/1198 arms; Adachi, 1928), 4% (8/200 fetus arms) and 2% (2/100 arms) by Müller (1903), and 2.3% (17/750 arms) by McCormack et al. (1953) the incidences for SMA are relatively lower.

Although the incidence of the SMA is very low, and to the best of our knowledge no clinical cases have been documented, it is important for clinicians to recognise its presence and the clinical problems that may be encountered, as may occur for the superficial ulnar artery (Cohen, 1948; Hazlett, 1949; Thoma & Young, 1992; Devansh, 1996). Accidental injection into the SMA instead of a vein is possible since the variant artery lies between the flexor muscles and the subcutaneous veins, or the artery can be ligated instead of the vein when a radial artery flap is prepared.

In Singer’s (1933) model for the development of the human limb arteries, neither the superficial median or ulnar arteries figured, nor was the superficial median artery described in Poteat’s (1986) model of the process of formation of the limb arteries. On the other hand, the superficial antebrachial artery, corresponding to the superficial median and ulnar arteries, can be found in the
reconstruction of the arterial system of the upper limb in a human embryo by Müller (1903). Based on Müller's model, the disappearance of the superior, middle and inferior superficial brachial arteries and the superficial antebrachial artery, and the distal parts of the median and interosseous arteries, and the persistence of the deep brachial artery cause the normal arterial system to be constructed (Figs. 2a, b). If the proximal part of the deep brachial artery, the middle superficial brachial artery, an anastomosing segment between the superficial antebrachial and ulnar arteries, and a
connection between the median and interosseous arteries disappear, the remaining arteries form the abnormal arterial pattern observed in the right upper limb in the present case (Fig. 2c). If, moreover, the rest of the deep brachial artery and the inferior superficial brachial artery shown in Figure 2c also disappear, the variation observed in the left arm is formed (Fig. 2d).

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