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A CASE OF THE BILATERAL SUPERFICIAL BRACHIAL ARTERIES WHICH CONTINUED TO THE RADIAL ARTERIES IN THE FOREARMS

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INDEXING WORDS

superficial brachial artery; radial artery; case report; Japanese cadaver

SYNOPSIS

During the dissection course of Kobe University School of Medicine, we found the bilateral superficial brachial arteries that continued to the radial arteries in a 90-years-old female cadaver. Each superficial brachial artery is classified Arteria brachialis superficialis lateralis inferior. This artery directly continued to the radial artery in the forearms on each side. Anomalous branching patterns of the (proper) brachial artery in this case belong to the type 7 of Adachi's classification. The incidence and embryological aspects of this anomalous arterial branching are discussed.

FINDINGS

We observed the bilateral superficial brachial arteries that continued to the radial arteries in the forearms in a cadaver during the ordinary dissection course of First Division, Department of Anatomy, Kobe University School of Medicine in 1995. The cadaver (Cadaver No. 2811) is a 90-years-old female whose causes of death were reported to be pneumonia and renal failure.

1. *Right superficial brachial artery* (Figures 1 and 2)

The right axillary artery passed under the medial and lateral roots of the median nerve (Adachi's type A) and continued to the brachial artery at the lower border of the teres major. After giving off the profunda brachii artery, the brachial artery branched into the superficial brachial and the (proper) brachial arteries. The right superficial brachial artery was originated

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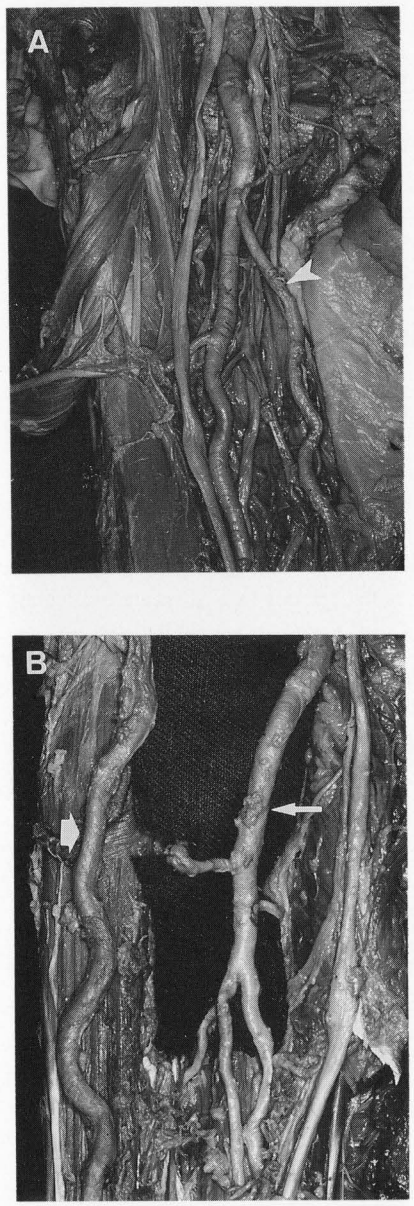

Figure 1. Photographs showing the superficial brachial artery (an arrow head) and the (proper) brachial artery (a slender arrow) and the radial artery (a wide arrow) in the right arm (A) and forearm (B).

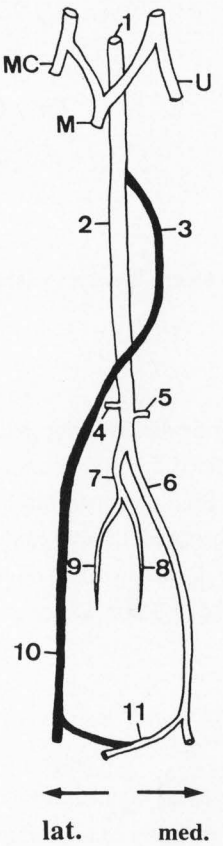

Figure 2. Schematic drawing of main arteries in the right upper limb. Abbreviations in figures 2 and 4 are as follows. U = Ulnar nerve, M = Median nerve, MC = Musculocutaneus nerve, 1 = Brachial artery, 2 = (Proper) brachial artery, 3 = Superficial brachial artery, 4 = Radial recurrent artery, 5 = Ulnar recurrent artery, 6 = Ulnar artery, 7 = Common interosseous artery, 8 = Anterior interosseous artery, 9 = Posterior interosseous artery, 10 = Radial artery, 11 = Superficial palmar arch.

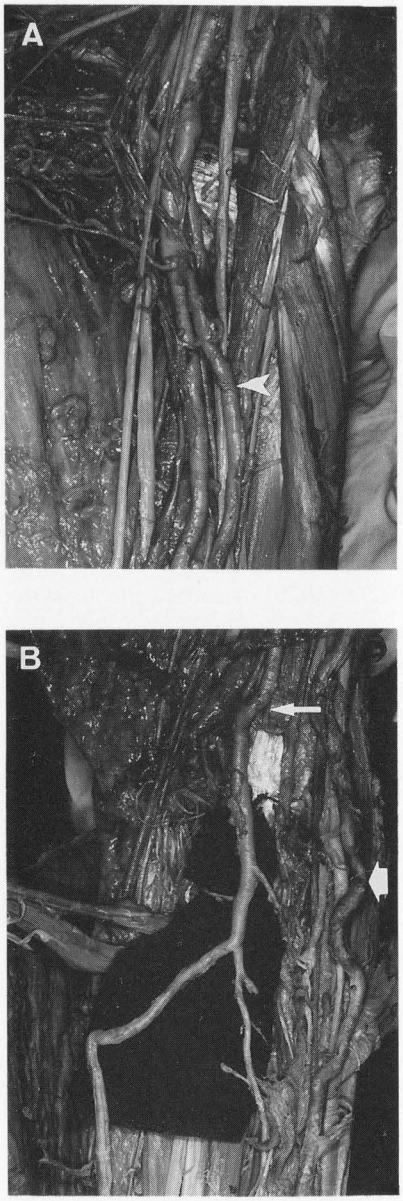

Figure 3. Photographs showing the superficial brachial artery (an arrow head) and the (proper) brachial artery (a slender arrow) and the radial artery (a wide arrow) in the left arm (A) and forearm (B).

from the medial side of the brachial artery at 3 cm distal to the insertion tendon of the pectralis major. This artery descended in the arm laterally to the ulnar nerve along the median nerve. Thereafter, it crossed the (proper) brachial artery and the median nerve anteriorly, and then continued to descend superficially to the brachioradialis in the lateral side of the forearm as the radial artery. The following course and branching pattern of the radial artery were usual.

2. *Left superficial brachial artery* (Figures 3 and 4)

The left axillary artery coursed under the roots of the median nerve (Adachi's type A) and continued to the brachial artery at the lower border of the teres major. The brachial artery branched into the profunda brachii and the (proper) brachial arteries, as observed on the right side. The superficial brachial artery was originated from the lateral side of the brachial artery at 3 cm distal to the insertion of the pectralis major. The artery briefly coursed laterally, and then crossed the median nerve anteriorly. It descended in the lateral side of the arm and continued to the radial artery in the forearm. The radial artery passed superficially to the brachioradialis. The following course and branching pattern of the artery were usual, as observed on the right side.

3. *(Proper) brachial arteries on both sides* (Figures 1, 2, 3, and 4)

The courses and branching patterns of the (proper) brachial arteries were almost symmetric on both sides. Each (proper) brachial artery which was a direct continua-

tion to the brachial artery descended with the brachial vein and the median nerve in the medial bicipital groove. It gave off the ulnar and radial recurrent arteries, and then bifurcated into the ulnar and the common interosseous arteries. The ulnar artery descended between tendon of the flexor digitorum superficialis and that of flexor carpi ulnaris, and formed the superficial palmar arch with the superficial palmar branch of the radial artery, thereafter it crossed the flexor retinaculum superficially. The common interosseous artery, another branch of the (proper) brachial artery, branched into the anterior and posterior interosseous arteries. The anterior interosseous artery descended anteriorly to the interosseous membrane of the forearm. The median artery which is a branch of the anterior interosseous artery in ordinary cases was not found in this case on each side. The posterior interosseous artery reached on the posterior surface of the interosseous membrane after piercing it. In both limbs, the (proper) brachial arteries were arranged almost symmetrically, and did not gave off the radial or median arteries.

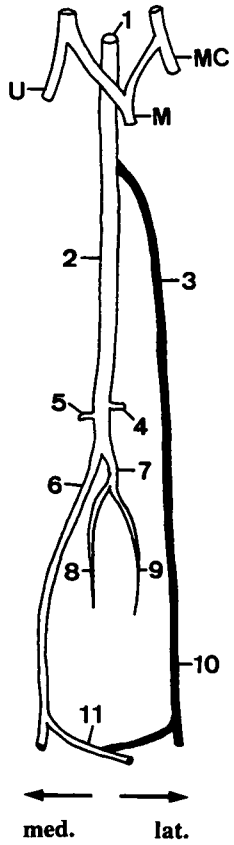

Figure 4. Schematic drawing of main arteries in the left upper limb.

DISCUSSION

Adachi (1928) classified the superficial brachial artery into 6 types, according to two criteria; (1) either the artery coursed in medial or lateral sides of the ulnar nerve, (2) the level of its origin. The superficial brachial arteries in the bilateral upper limbs observed in the present cases are classified as the Arteria brachialis superficialis lateralis inferior, according to his classification. Additionally, Adachi (1928) described 19 types of anomalies of arterial branching pattern in the upper limb, in relation with continuity to the (proper) brachial artery and neighboring structures. The present superficial brachial arteries in both limbs belong to the type 7 of Adachi's classification.

The incidence of the superficial brachial artery is reported to be 25.9 % in Japanese adults (Adachi, 1928) and 29.8 % in embryos (Mori, 1941). This appeared to be slightly higher in Swedish than in Japanese; 27 % in adult and 38 % in embryos (Müller, 1903). Therefore, the superficial brachial artery itself is not rare. The continuity of the superficial brachial artery to the radial artery is reported to be 11.7 % (23 cases in 410 cadavers;

Adachi, 1928), or 17.9 % (11 cases in 206 cadavers; Mori, 1941) in Japanese adults. The superficial brachial artery that continued to the superficial antebrachial arteries is reported to be 3.2 % (13 cases in 410 cadavers; Adachi, 1928). Thus, in cases of the superficial brachial artery that extends beyond the forearm, if present, it continues to the radial artery rather than to the superficial antebrachial artery. The incidence of the type 7 to which the present case belongs is 5.3 % (22 cases in 410 cadavers; Adachi, 1928). Some cases of the bilateral superficial brachial arteries were reported in Japan (Mori, 1941; Tuda, 1938; Sato et al, 1955). However, no case of the bilateral superficial brachial arteries which show the type 7 of Adachi's classification is reported.

In the human embryonic development, the superficial brachial artery arose from the brachial artery in embryos of 21 mm crown-heel length. Thereafter, the superficial brachial artery descended in the upper arm, and supplied the forearm with the median artery which was connected with the superficial brachial artery in embryos of about 23 mm crown-heel length (Lippert and Pabst, 1985). In normal developmental course, however, this artery reduced in size, after the radial artery was originated from the brachial artery and supplied adequate blood flow to the forearm including the hand. Finally, the superficial palmar arch was formed by the radial and ulnar arteries, and then the superficial brachial artery became to disappear (Lippert and Pabst, 1985).

In our case, each superficial brachial artery was gave off from the brachial artery and connected directly to the radial artery. This case with other reported cases (Adachi, 1928; Mori, 1941) supports the presumption that the radial artery in the forearm may have been originally the superficial branch of the arteries of the upper limb (Matsumoto et al, 1994).

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