BILATERAL HIGHER DIVISION OF BRACHIAL ARTERY AND ITS CLINICAL SIGNIFICANCE– A CASE REPORT

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ABSTRACT

BACKGROUND

Arterial variation of superior extremity is common in Indian population. Brachial artery is the chief artery of the upper limb. Brachial artery is the continuation of axillary artery at the lower border of teres major and terminates by dividing into radial and ulnar arteries at the level of the neck of radius. In the present case, brachial artery bifurcates at higher level on both sides with superficial course of radial artery. Having good anatomical knowledge of arterial variation is very useful in various diagnostic procedures like cardiac catheterisation, angiography and arterial grafting.

KEYWORDS

Brachial Artery, Variation, Superficial Radial Artery, Angiography.

HOW TO CITE THIS ARTICLE: Kataria DS, Potaliya P, Agrawal D, et al. Bilateral higher division of brachial artery and its clinical significance– A case report. Journal of Research in Human Anatomy and Embryology 2017; Vol. 3, Issue 1, Jan-June 2017; Page:3-4.

BACKGROUND

Brachial artery is the principal artery of the arm. It is the continuation of axillary artery at the lower border of teres major muscle and divides into radial and ulnar artery at the level of neck of radius in cubital fossa.[1] Many variations are found by authors such as absence of brachial artery, radial artery, ulnar artery and their branches. There may be difference in the origin of arteries and course that interferes with the surgical as well as therapeutic procedures.[2] The proximal division of brachial artery with superficial course of radial artery is the most frequent vascular variation found in the superior extremity.

Case Report

Out of 16 cadavers dissected by First year MBBS students in Department of Anatomy of AIIMS, Jodhpur, the short segment of brachial artery with its bilateral higher terminal division was observed in one male cadaver aged 65 years.

In the right upper limb of cadaver, brachial artery bifurcates into medial and lateral branches 5.7 cm below the lower border of teres major muscle. Further the medial branch gets divided into superficial and deep branches at the neck of radius and continues as radial and ulnar artery respectively whereas the lateral branch continues as common interosseous artery.

Course of Radial Artery

It runs downward from medial to lateral side superficial to the flexor carpi radialis muscle. At the level of wrist, it lies lateral to the tendon of flexor carpi radialis, then it follows its normal path.

Financial or Other, Competing Interest: None.
Submission 08-02-2017, Peer Review 01-03-2017,
Acceptance 07-03-2017, Published 27-05-2017.
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Course of Ulnar Artery

In the upper part of forearm, first it runs above to the flexor carpi radialis, then passes down, and finally it lies deep to the flexor digitorum superficialis. In the lower part of forearm, ulnar artery emerges out from the medial border of flexor digitorum superficialis. At the level of wrist, ulnar artery lies between the tendon of flexor carpi ulnaris and flexor digitorum superficialis.

Common Interosseous Artery

The lateral branch of brachial artery continues as the interosseous artery. It runs downward resting on the biceps brachii with the lateral convexity, where it is crossed by the median nerve from lateral to medial side. In the cubital fossa, it lies in between the median nerve medially and tendon of biceps brachii muscle laterally, and then it follows its normal course in the forearm.

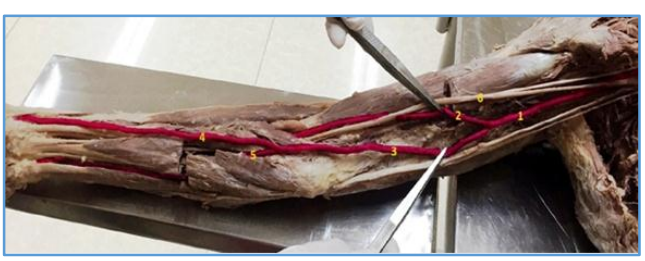

Figure A. Showing Right Upper Limb- 1. Brachial Artery, 2. Common Interosseous Artery, 4. Superficial Radial Artery, 5. Ulnar Artery, 6. Median Nerve

On the left side, brachial artery terminates by dividing into radial and ulnar artery 5.3 cm below the lower border of teres major.

Radial Artery

In the mid arm, radial artery runs downward resting on biceps brachii, by crossing the median nerve from medial to lateral side. In the cubital fossa, the positions from medial to lateral side are– median nerve, radial artery, tendon of biceps brachii

and superficial radial nerve. It takes a superficial course in the forearm, lies just medial to the medial border of brachioradialis. At the level of wrist joint, it lies in between the tendon of brachioradialis and flexor carpi radialis.

Ulnar Artery

The ulnar artery follows its normal course after passing deep to the deep head of pronator teres.

Figure B. Showing Left upper limb- 1. Brachial Artery, 2. Superficial Radial Artery, 3. Ulnar Artery, 4. Median Nerve

DISCUSSION

Vascular variation in the superior extremity was first published by von Haller in 1813.[3] He made embryological studies on disparity of vasculature pattern, but he failed to obtain the exact findings.

Embryological basis of Variation in the Arterial Pattern: Axis artery of the superior extremity is derived from the lateral branch of 7th intersegmental artery. The proximal portion of axis artery forms axillary artery which continues as brachial artery and its distal portion persists as anterior interosseous artery. The last arteries that appear in the forearm are radial and ulnar arteries.

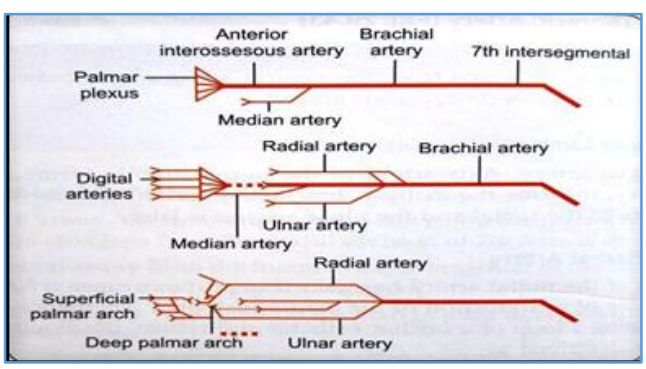

Figure C. Showing Development of Arteries of the Upper Limb

The radial artery originates from the proximal part of brachial artery, near the origin of ulnar artery. Further the proximal origin of radial artery normally disappears, that is why both radial and ulnar arteries originate from the same level. So, the developmental anomaly of vasculature of upper limb can be related to formation, persistence and disappearance of any portion of axis artery.

Many authors reported the higher division of brachial artery. In the present case, right brachial artery bifurcates into common interosseous and a superficial branch which further divides into superficial radial and deep ulnar arteries. The radial artery follows a superficial course in the forearm, lies deep to the antebrachial fascia. Similar course was reported by Nagalaxmi that is higher division of brachial artery at the level of middle of arm with superficial course of radial artery in the upper part of forearm.[4]

In the present case, on left side, brachial artery encountered with higher division in the middle of arm. Radial artery runs superficially by crossing the median nerve from medial to lateral side and ulnar artery runs in normal pattern. Similar study was seen and published by Yalcin et al in 2006.[5]

Clinical Significance

Variations found in our case report with higher division of brachial artery and superficial course of radial artery is very significant for clinical cases especially to the Plastic Surgery and Reconstructive Microvascular Surgery departments. Radial forearm flap is commonly used in the oral surgery to reconstruct the oral mucosa. In the reconstructive and orthopaedic surgery of upper limb, the superficial radial artery is more prone to get cut or ligated mistaking for a vein. Accidental injection of drug in the superficial artery causes vascular occlusion that leads to gangrene of hand. The arterial variation may cause problem in measuring the blood pressure.

CONCLUSION

A good anatomical knowledge of variation of arterial pattern is very useful in various diagnostic purposes like cardiac catheterisation, angiography and arterial grafting. The disparities in the origin and course of arteries have clinical importance for vascular and reconstructive surgeries.

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