Bilateral high origin of terminal branches of brachial artery: a case report

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Abstract

A case of bilateral high termination of brachial artery was found during a cadaveric dissection at NEIGRIHMS, Meghalaya. The brachial artery of both arms in the upper 1/3rd divided into superficial and deep branches, the superficial artery was observed anteromedial and the deep artery posteromedial in relation to the median nerve. In the cubital fossa, the deep artery passed beneath the pronator teres muscle to give common interosseous artery which divided into anterior and posterior interosseous branches. The main trunk followed normal ulnar arterial course. In both the arms, the superficial branch of brachial artery remained lateral to the median nerve to reach the cubital fossa where it passed deep to the bicipital aponeurosis and descended just beneath the brachioradialis muscle, following the normal course of radial artery. These developmental variations were thoroughly discussed and compared with previously published findings with their clinical importance.

Key words: ulnar artery, radial artery, common interosseous artery

Introduction

The brachial artery is the continuation of the axillary artery and provides the main arterial supply to the arm. It begins at the inferior border of the teres major muscle and ends at the cubital fossa opposite the neck of the radius where undercover of the bicipital aponeurosis; it divides into the radial and ulnar artery. The brachial artery relatively superficial and palpable throughout the course lies anterior to the insertion of coracobrachialis and brachialis. As the brachial artery passes infralaterally in lower part of arm, it accompanies the median nerve, which crosses it anteriorly. In the cubital fossa the median nerve lies medial to the brachial artery. Brachial artery gives many unnamed muscular branches and humeral nutrient artery during its course in the arm. The ulnar artery and radial artery are the terminal branches of the brachial artery which divides in front of the neck of the radius in the cubital fossa. Ulnar artery leaves the cubital fossa by passing deep to both heads of pronator teres muscle. It runs along the medial border of the forearm along with the ulnar nerve lying medial to it. Ulnar artery then enters into the palm by passing superficial to flexor retinaculum. The common interosseous artery is a branch of the ulnar artery which divides into anterior and posterior interosseous arteries and supply to the anterior and posterior compartments of forearm respectively.

The radial artery lies on the lateral side of the forearm deep to the brachioradialis muscle. On the distal part of the forearm it lies on the anterior surface of the radius and covered by skin and fascia where we can feel the radial arterial pulsation. The radial artery leaves the forearm by winding around the lateral aspect of the wrist and crosses the floor of the anatomical snuff box.

Case report

During the routine cadaveric dissection in the practical classes for the medical students of NEIGRIHMS, Shillong, Meghalaya, India, the authors observed the developmental bilateral variations in the origin of ulnar and radial arteries in a 65 years old male cadaver. The course of the arteries and their branches in the arm and forearm were thoroughly traced and observed for the anatomical variations of brachial artery (BA). The course of the axillary artery and its relation with the brachial plexus in both the upper limbs were found to be normal. But in both the arms, it was observed that the BA was divided into two terminal branches at upper 1/3rd of the
arm immediately 4 cm distal to the origin of profunda brachii artery (fig.1 & fig.2).

The median nerve remained on lateral side of these two terminal branches at the upper third of arm (fig.1 & fig.2) whereas, at the middle third it passed between them; where one remained superficial and the other was deep, to the median nerve. At the lower third of the arm, the median nerve crossed the deep branch of the BA anteromedially. At the cubital fossa the deep branch of BA was lying deep to the bicipital aponeurosis, as well as to both the heads of the pronator teres muscle. Then it descended downward along the medial border of the forearm with the ulnar nerve to enter the palm by passing superficial to flexor retinaculum and continued as the superficial palmar arch, maintaining the normal course of ulnar artery. It was observed that in the distal part of cubital fossa, ulnar artery gave a very short common interosseous artery which immediately divided into anterior and posterior interosseous artery. The anterior interosseous artery descended anterior to the interosseous membrane along with the anterior interosseous branch of median nerve; while the posterior interosseous artery entered the extensor compartment of the forearm and descended along with the posterior interosseous nerve.

The superficial branch of the BA descended downward and crossed the median nerve anteriorly at the middle 1/3rd of the arm; lateral to the median nerve it entered the cubital fossa deep to the bicipital aponeurosis. Beneath the brachioradialis muscle it descended along the lateral border of the forearm.

At the lower border of the forearm it left the anterior compartment of forearm by winding around the lateral aspect of the wrist and entered into anatomical snuff box and contributed to both the superficial and deep palmar arch.
Discussion

The ulnar artery (UA) and the radial artery (RA) usually arise at the cubital fossa in front of the neck of the radius. But in the present report, it was observed that the brachial arteries (BA) of both sides divided into two terminal branches at the upper 1/3rd of the arm 4 cm distal to the origin of the profunda brachii artery. In the middle 1/3rd of the arm, median nerve passed between the two terminal branches. The artery which was placed superficial to the median nerve was considered as radial artery and which was placed deep to the median nerve was considered as ulnar artery. In the lower end of the arm both the arteries were situated lateral to the median nerve. BA is derived from the axis artery of the upper limb which is derived from the seventh cervical intersegmental artery. The radial and the ulnar arteries develop by angiogenesis from the axis artery of the upper limb close to the bend of the elbow.

Shewale et. al10 have reported bifurcation of the left BA at the lower border of teres major.

Rosse and Rosse4 have suggested that about 30% of individuals have two BA’s in an arm. The two arteries usually unite in cubital fossa and divide into ulnar and radial arteries.

Earlier investigators have also mentioned about the variations of the terminal branches of BA.5,6,7,8. In 1930, Huber4 reported additional branches of BA. He has observed trifurcation of BA into ulnar, radial and common interosseous arteries. On the other hand, Patnaik et al9 observed the trifurcation of BA into ulnar, radial & radial recurrent anterior in the right upper limb of a 50 year old male cadaver.

Bilodi et. al4 have reported in the left upper limb, the artery terminating into ulnar, radial and the common interosseous artery whereas in the right upper limb, the artery terminated into ulnar and radial artery and the common interosseous artery was given off from the radial artery but not from ulnar artery.

Karleson and Nchiehve10opined that high origin of radial artery is the commonest vascular variation in upper limb which was observed in about 10% patients by angiographic studies. According to Patnaik et al9, it was about 14.27 %. According to Anson12, it was reported as 15% and Miller13 reported as 3%.

Mc Cormak et al14 termed the high origin of ulnar artery as superficial ulnar artery and were observed in 2.26% cases. Adachi15 observed in 7% of cases and Muller16 in 2 % cases about the high origin of ulnar artery.

A case of high division of BA was reported by Vare and Bansal17. They observed that the superficial artery descended downward and divided into the radial and ulnar artery at the cubital fossa whereas the deep artery continued into the forearm as interosseous complex. Cherian et al18 and Aughteesten et al19 have also reported the variations of the branching pattern of BA.

Conclusion

The present report provides additional information on the branching and distribution pattern of the BA. Anomalies in origin and branching pattern of the principal arteries is highly significant for the radiologists, orthopaedicians and vascular surgeons while performing traumatic vascular repair, by-pass procedures and reconstructive plastic surgery.

References:


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