

High up bifurcation of brachial artery with twisting of ulnar and radial artery distally along with clubbing of fingers-a case report of a male cadaver died at around 65years

Abstract

After cleaning the area by scissors and scalpel, a high up bifurcation of brachial artery was seen around 6cm below the inferior border of teres major muscle. Then the artery was traced proximally and distally and its high up bifurcation traced above insertion of coracobrachialis muscle below two roots of median nerve. Calibre of ulnar artery is larger in diameter than the radial branch which is an visual approximation above the elbow joint but below the elbow joint both are of equal calibre. Usually ulnar artery calibre is found to be smaller than radial artery in the previous review literatures. Both the branches of the ulnar and radial artery are found to be twisted distally and superficially. Median nerve lies medial to the bifurcated branches. Among the bifurcated branches the medial branch is called brachio radial branch and lateral branch is known as brachio ulnar branch.

Keywords: scalpel, brachial, artery, bifurcation, high up

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Introduction

The word “Brachial” is derived from the Greek word Brakion meaning ‘shorter’; brachium also means arm.¹ Normally brachial artery is a continuation of axillary artery at the inferior border of teres major muscle in axilla. Towards the distal end, it lies medial to the bicipital aponeurosis. At the level of neck of radius, in cubital fossa, artery bifurcates into two terminal branches, medially ulnar artery and laterally radial artery.² At the wrist, superficial and deep branches of ulnar artery form superficial palmar arch and deep palmar arch along with two branches of radial artery and radial artery runs laterally through anatomical snuff box located in between two heads of dorsal interosseous muscles.³ There are many articles reporting variation of division of brachial artery at different levels, but mid arm variation i.e, bifurcation at the level of insertion of coracobrachialis muscle is of common occurrence.⁴ Normal vascular development including patterning of the blood vessels is influenced by local hemodynamic factors. Altered hemodynamic environment may give rise to variant patterning of blood vessels.⁵ Like bifurcation of brachial artery into ulnar and radial artery, there may be trifurcation of brachial artery into ulnar, radial and anterointerosseal artery. Sometimes brachial artery may terminate into ulnar, radial and radial recurrent artery. Again brachial artery may trifurcate into radial, ulnar and superior ulnar collateral artery. Variations in upper limb arteries are fairly common. Major variation is present in about 25% of the subjects studied for brachial artery. The first reported arterial variation in upper limb was by Von Haller in 1813. Incidence of high division of brachial artery is 25% in various population of the world. The highest percentage of brachial artery variation is mainly trifurcation of brachial artery. Arey in 1957 highlighted that there may be persistence of vessels which normally disappear and obliterations of those which normally do exist.

This is largely due to altered hemodynamic environment.⁶ Effect 6 knowledge of this variation is important for day to day practice for measurement of blood pressure using sphygmomanometer cuff in the arm. Knowledge of this variation is also important to carryout surgical interventions in arm.⁷

Aim

To study about anatomical variation and branching pattern of brachial artery.

Materials and methods

Materials

Formalin, Scalpel, Scissors, Toothed forceps, Pinpointed forceps, Plain forceps, Cotton cloth

Method

Present study was done on a cadaver of a human body of around 65years old male in the department of anatomy GIMSH Durgapur, West Bengal in the month of October 2017. The dissected part was taken from a formalin fixed embalmed human cadaver used for routine dissection of undergraduate students irrespective of age and race. Dissection was done according to the standard manual dissection. Skin, superficial fascia, deep fascia were removed till we get the flexor group of muscles. Muscles were separated using scalpel and plain forceps. Variations of arterial pattern noted. After cleaning the area by scissors and scalpel, a high up bifurcation of brachial artery was seen around 6cm below the inferior border of teres major muscle into radial and ulnar artery. Photograph of the brachial artery taken for proper documentation (Figure 1).

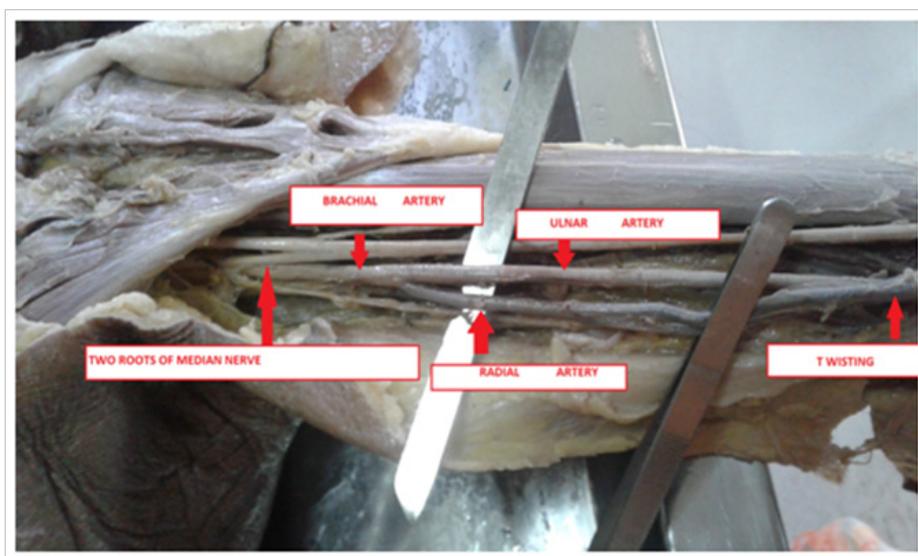


Figure 1 A high up bifurcation of brachial artery.

Case report

After cleaning the area by scissors and scalpel, a high up bifurcation of brachial artery was seen around 6cm below the inferior border of teres major muscle. When the artery was traced proximally and distally its high up bifurcation seen above insertion of coracobrachialis muscle below two roots of median nerve. The study was approved by institutional ethics committee of the medical college and hospitals. On gross examination differences between artery and veins detected by palpatory method where wall of artery is thick and veins is thin. Lumen of vein is larger than artery and veins always found in collapsed state. One artery was found in the cubital fossa medial to the bicipital aponeurosis. When the artery was traced proximally, at around 6cm below the inferior border of teres major muscle it was found to be connected with another branch thinner than the original stem. When traced distally it was found to be deviated medially towards the wrist joint forming ulnar artery. The other branch gets twisted in the cubital fossa and found to be deviated laterally towards radial side forming radial artery. Another branch was getting origin from the lateral side of ulnar artery in the cubital fossa probably superior ulnar collateral branch. Lumen diameter of ulnar artery is found to be larger than the radial artery proceeding laterally above elbow joint but below elbow joint diameter are equal around 5mm. High up bifurcation is into a medial branch called brachioradial artery and a lateral branch called brachioulnar artery situated superficially. This two bifurcated branches are situated medial to the median nerve. The brachioradial artery passes below the posterior lateral aspect of median nerve and passes along the radial side of forearm whereas brachioulnar artery passes deep into the forearm muscles in cubital fossa and the passes along ulnar border of forearm.

Embryological basis

In the fetal life, the vascular patterns change as the limb buds develop, chiefly by angiogenesis (sprouting from existing vessels). The primary axis artery becomes the brachial artery in the arm and common interosseous artery in the forearm, which has anterior and posterior interosseous branches. The ulnar and radial arteries are terminal branches of the brachial artery. The developmental changes

can be explained on the basis of the persistence of vessels which are normally obliterated, or the disappearance of vessels which are normally retained, or an incomplete development, or sprouts from the axis artery of the developing upper limb bud. In the present case, the high origin of ulnar artery may be due to the fact that the ulnar artery sprouted from axis artery in the arm and coursed superficial to the ventral muscle mass of the arm.

Bifurcation of the brachial artery into radial and common interosseous arteries may be correlated with the sprouting of posterior interosseous artery from the axis artery distal to the sprouting of radial artery in the cubital fossa. And, the portion between radial and posterior interosseous arteries becomes common interosseous artery and the remaining part of axis artery becomes anterior interosseous artery.

The knowledge of the anatomical variant of the high origin of ulnar artery is helpful in performing reconstructive surgical procedures for use as microvascular recipient or donor vessel, and its superficial course makes it more accessible to cannulation. Also, the proximal portion of superficial ulnar artery (in the arm) can be harvested for coronary bypass grafts. However, superficial ulnar artery may be injured during intravenous drug administration or percutaneous brachial catheterization, if its presence is not properly diagnosed. This may lead to ischemia of the forearm.

Discussion

Kumar V et al.⁶ found a case of high up bifurcation of brachial artery at about 2cm below the lower border of teres major muscle. Both the branches are crossing one another superficially. In our study, on a cadaver in 2017, we also found the same as mentioned above that means both studies are correlating to one another. Saraswati P, Christi AJ, Sainath S in 2017 found that higher bifurcation of radial artery and ulnar artery shows their circumference as around 5mm below elbow joint. This correlates with our present finding. Tamgire DW, Santakke YA, Rajshekhar SSSN, Arabindhan K in 2017 found that brachial artery can be divided into medial branch called brachioradial artery and a lateral branch brachioulnar artery distal to inferior border of teres major muscle. This correlates to our present finding.

Conclusion

This study is important in view of microsurgical procedures on arm and forearm. Thereof every surgeons should get aware of such type of arterial variation of arm and forearm and also hand like incomplete superficial palmar arch.

Acknowledgments

None.

Conflict of interest

Author declares that there is no conflict of interest.

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