



LEVEL OF BIFURCATION OF BRACHIAL ARTERY AND ITS CLINICAL SIGNIFICANCE

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ABSTRACT **Background:** Brachial artery is the continuation of the axillary artery and the brachial artery usually divides in the upper limb at the level of the neck of the radius in the cubital fossa. In some specimen, it may be bifurcates into radial and the ulnar artery at a higher level than the normal. The level of division of the brachial artery may vary. Authors also reported the absence of the brachial artery, in that case the radial and the ulnar artery arose directly from the axillary artery. The present study is aimed to assess the percentage of high bifurcation of the brachial artery into radial and the ulnar artery. **Materials and Methods:** The study was carried out in the Department of Anatomy, Sree Mookambika Institute of Medical Sciences. A total of 108 specimens on both sides of the upper limb was observed and traced the brachial artery for its division. **Results and discussion:** In the present study, out of 108 specimens, bifurcation of brachial artery at the level of neck of radius is about 96.2% and the division of brachial artery at the level of middle third of the arm is 3.12 % and the division at the level of upper third of the arm is 1.08 % was observed. **Conclusion:** Vessels of the upper limb have much more importance in different kinds of diagnostic, analytic and therapeutic studies. Diagnostically this type of variation may disturb the evaluation of angiography images. Further knowledge of such variation has got clinical importance especially in the field of orthopaedic, vascular, and plastic surgeries.

KEYWORDS : Brachial artery, radial artery, ulnar artery

Introduction:

The brachial artery is the continuation of the axillary artery beyond the inferior border of teres major muscle. The common level of bifurcation of the brachial artery is at the level of the neck of the radius and divides into radial and ulnar arteries.¹ Median nerve is closely related to the brachial artery. An intimate knowledge of the anatomy of arteries of upper extremities and the common variation is important to limb surgeons. Variation in the vasculature of the upper extremity is essential to prevent thrombosis, injury, gangrene & even amputation, especially in dialysis patients or undergoing arteriography.² Variation of the upper limb arteries have been well documented by a number of authors and have a considerable significance towards surgical and clinical point of view.³

Materials and Methods:

The present study was observed in 108 upper limb specimens on both sides in the department of anatomy. Dissection of upper limb was carried out according to the instruction given in Cunningham's Manual of Practical Anatomy Volume -1.

Result:

In 108 specimens the arm was dissected, and the axillary artery and the brachial artery was identified and traced carefully for any variations. Among 108 specimens, the variations were found in 4 cadaver specimens. In two specimens, the brachial artery was divides at the upper and the middle third of the arm into radial and ulnar arteries, the radial and ulnar artery passes downwards along the medial border of the biceps brachii muscle and the median nerve lies on the lateral side of the proximal part of the artery and at the lower 3rd of the arm it the median nerve crosses the artery and runs on the medial side of the artery and reaches the cubital fossa and rest of the course is normal (fig:1). In one specimen, the division of brachial artery begins in the junction of upper and the middle third of the arm into radial and ulnar artery, both the arteries are superficially running downwards along the medial aspect of biceps brachii and in the lower 3rd of the arm the ulnar artery was crossed by the median nerve from medial to lateral side and then the ulnar artery can be seen in the medial side of the median nerve at cubital fossa. The radial artery was found lateral aspect of the median nerve and reaches the cubital fossa and then the remaining course of both ulnar and the radial artery is normal. In one specimen, the division of the brachial artery begins at the junction of middle and the lower third of the arm into radial and ulnar arteries. Both the arteries pass downwards along the lateral and the medial border of biceps brachii muscle and the rest of the course is normal.

Fig 1: Showing the division of brachial artery at the level of junction between upper and middle third of the arm



Discussion:

Variation in the branching pattern of the arteries of the upper limbs have clinical and surgical significance.⁴ The anatomical knowledge of anomalous division of the brachial artery is important during percutaneous arterial catheterization, so as to prevent any complication arising from accidental damage of anomalous vessels and it is important for surgeons using flaps for reconstructive surgeries, so the higher division assumes a greater clinical significance.^{5,6} The brachial artery may arise as high as the axillary artery, but most commonly it arises from the proximal third of the arm.^{9,10} The high origin of the radial artery is the most frequent anomaly in the arterial pattern of the upper limb (incidence of 14.27% in dissected material). Whereas a superficial ulnar artery has been reported in 2% of cases.¹¹ A case of high origin of the radial artery from the 3rd part of the axillary artery proximal to the two roots of the median nerve have been reported in 2011.¹² In 2013, Jayasabarinathan.M et al reported a case of high bifurcation of the brachial artery with the superficial course of the radial and ulnar artery in left forearm.¹³ Namani Sathyanarayana et al. (2010) documented a case of an early division of the brachial artery in the middle of right side arm into the radial and ulnar artery both of same caliber.¹⁴ Vandana.R, Suresh.N.M et al found a high division of the brachial artery in the proximal third of the arm was found in 3 cases out of 60 specimens.¹⁵ Talalwah.WA mentioned that diagnostically, prior knowledge of anatomy of the upper limb vessels may disturb the evaluation of arteriography images and can have serious implications for orthopaedic and vascular surgeries.¹⁶ Jafae Soog.A identified a case of variation in the bifurcation pattern of the brachial artery in a 35years old male cadaver in which the normal anatomical course was observed in axillary arteries on both sides. The principle brachial artery in the left upper limb descends from the axillary artery where median nerve laid anteromedial and in the proximal portion of the middle third of the arm the brachial artery bifurcates.¹⁷ Pokhler.R identified a unilateral bifurcation of the brachial artery and said that blood pressure, which is normally measured in the arm in the brachial artery is also affected where there are double.¹⁸ Aughsteen.AA, et al described the bilateral variation in the branching pattern of the brachial artery and

reported that the bifurcation of the brachial artery at a higher level is one out of eight or ten individuals.¹⁹ Varlekar.P did a study report on higher bifurcation of the brachial artery with the superficial course of the radial artery in the forearm.²⁰ Manimekalai.M reported a case of 70 years old male cadaver showing high bifurcation of the brachial artery and an unusually short segment brachial artery in the right arm.²¹ Vishal Kumar found that the brachial artery bifurcate in to lateral and medial branches at 9.5cm distal to the lower border of teres major.²² Pushpalatha observed a case of bilateral high division of the brachial artery. Radial artery passes downwards and laterally, ulnar artery passes downwards and medially. In cubital fossa it passes deep to the ulnar head of pronator teres.²³ According to Singh.H the brachial artery in the upper 3rd of the arm divides into radial and ulnar arteries at about 4cm distal to the lower border of teres major.²⁴ High bifurcation of the brachial artery presenting with acute ischaemic secondary to an embolic events was reported by Cherukupalli.C.²⁵ High divisions of the brachial artery were found in 3 cases out of 48 cadavers by Padma Varlekar.²⁶

CONCLUSION:

The vessels of the upper limb are frequently used for cardiac catheterization and awareness of such variation may check any inadvertent injury.⁷ The point of division of the brachial artery is the commonest site for embolism and a high bifurcation would result in a large area of ischaemia than expected and it is also important for all cases of traumatic amputation and re-implantation.⁸ The study of basic anatomy is important for understanding circulation of the blood flow to improve outcome. In orthopaedic surgeries around elbow, accidental crus injuries leading to haemorrhage require its special mention. Diagnostically this type of variation may disturb the evaluation of angiographic images. Further knowledge of such variation has got clinical importance particularly in orthopaedic, vascular and plastic surgeries.³ Interventionally accidental punctures of superficially placed arteries may occur while attempting the venepuncture. It is prone for injury during limb surgeries.²⁷

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