

## A Study Of Variation In Level of Origin of Brachial Artery And Its Branches In Cadavers

<sup>1</sup>Dr. Sanjay Vikani, <sup>2</sup>Dr. Pankaj Maheria, <sup>3</sup>Dr. Kuldeep Suthar, <sup>4</sup>Dr. Satish Patel

<sup>1,3</sup>Assistant Professor, <sup>2</sup>Associate Professor, <sup>4</sup>Tutor, Dept. Of Anatomy,  
GMERS Medical College, Dharpur, Patan.

### ABSTRACT

**Introduction:** Brachial artery is the continuation of the axillary artery at the distal border of teres major. It ends at the level of neck of radius by dividing into radial & ulnar arteries. A detailed description of the vascular pattern of upper limbs especially their variations in their origin & branching pattern is of utmost importance anatomically in general and clinically in particular.

**Objective:** This study is more informative to know the arterial pattern in this part of Central Gujarat. The primary objective of the study is to establish pattern of human brachial artery & its origin, length, course, branches, and the measurement of the point of origin of branches of the brachial artery. The study also includes the pattern of variations in origin as well as branching

**Materials and Method:** This is a morphological study in which the study was carried out in 25 cadavers by precisely dissecting brachial artery & its branches. After the dissection each dissected part was cleaned and numbered and the arteries were painted red. The normal and variant arteries were observed and photographs of the variant upper limbs were taken for reference.

**Results:** In 50 upper extremities, 3 (6%) specimens possessed major arterial variations in the brachial artery and its branches and patterns.

**Conclusion:** Knowledge of the brachial artery and their variations are of clinical and surgical importance. It is prudent to do pre-operative studies of the brachial and ante brachial arteries and their branching patterns, to prevent possible complications post operatively.

**Key Words :** Brachial artery, radial artery, ulnar artery, profunda brachii artery.

### INTRODUCTION

Brachial artery is the continuation of axillary artery and begins at the distal border of the tendon of teres major and ends about a centimeter distal to the elbow joint, at the level of the neck of radius by dividing into radial and ulnar Arteries. At first it is medial to the Humerus, but gradually turns anterior to it until it lies midway between the humeral epicondyles.<sup>[1]</sup> Anomalies of blood vessels may be due to (i) the choice of unusual paths in the primitive vascular plexuses, (ii) the persistence of vessels normally

obliterated, (iii) the disappearance of vessels normally retained, (iv) complete development and (v) fusions and absorption of the parts usually distinct<sup>[2,3,4]</sup>

A detailed knowledge of the vascular pattern of upper limbs especially the variations in their origin, course and branching pattern is of most importance anatomically & clinically. These variations have drawn attention of various clinicians and interventionists due to the advanced surgical procedures practiced in vascular surgeries, plastic (reconstructive) surgeries and also for diagnostic

#### Address for correspondence:

Dr. Sanjay Vikani, Assistant Professor, Department of Anatomy, GMERS Medical College, Dharpur, Patan, Gujarat- 384265.  
Email id: doc.vikani@gmail.com Mob: 09824850014

and therapeutic approaches. So, a detailed study of brachial artery & its branching pattern in upper limbs would be of use to anatomists, surgeons and radiologists to identify abnormalities through invasive and non invasive methods.<sup>[5,6]</sup>

**Objective:** This study is more informative to know the arterial pattern in this part of Central Gujarat. The primary objective of the study is to establish pattern of human brachial artery & its origin, length, course, branches, and the measurement of the point of origin of branches of the brachial artery. The study also includes the pattern of variations in origin as well as branching.

#### **MATERIALS AND METHODS:**

The present study was undertaken on 25 embalmed cadavers in S.B.K.S. M.I. & R.C., Sumandeep Vidyapeeth, Piparia, and Medical College Vadodara, Gujarat. The cadavers were donated by relatives with consent letter and death certificate. None of them had any traumatic lesions or surgical procedures or any physical abnormality in the upper limb. This study were carried out in 25 cadavers, in which brachial artery & its branches were dissected with precision, according to Cunningham's Manual of Practical Anatomy.<sup>[7]</sup> After the dissection each dissected part was cleaned and numbered and the arteries were painted red. The normal and variant arteries were observed and photographs of the variant upper limbs were taken for the references.

#### **STATISTICS:**

Analysis was performed on data using SPSS version 13.0.

#### **RESULTS:**

In 50 upper extremities, we found 3 (6%) specimens possessed major arterial variations in the brachial artery and its branches and patterns, as follows:

Origin of profunda brachii artery was found from

3rd part of axillary artery. This artery was at a higher level than the lower border of teres major muscle. So the measurement of the point of origin was deferred in one specimen. (Figure-1) (Table-1 & 2)

**Figure - 1. High Origin of Profunda Brachii**



Origin of the radial artery was found from 2nd part of axillary artery. Radial artery was originating at a higher level; it measured 44.2 cm and originated from 2nd part of the axillary artery. (Figure-2)

**Figure - 2. High Origin of Radial Artery**



High division of brachial artery into radial and ulnar arteries in middle of the arm. In this specimen length of brachial artery was 8.6cm, radial artery 36.5cm, ulnar artery 26.6cm, while mean length of brachial artery was found to be 22.70cm. (Figure-3)

**Figure- 3. High Bifurcation of Brachial Artery**



#### **DISCUSSION**

Knowledge of the arterial pattern of brachial and ante-brachial arteries in upper limbs and their variations are very important for surgeons and radiologists as it helps to identify the abnormalities by various studies. Anatomy of these arteries is an increasingly vital component in many therapeutic and surgical procedures and hence with this

background several studies have been conducted by several authors. The radial forearm flaps are used in various cosmetic surgeries, like for burns, and island flaps are used to replace soft tissue defects of the hand. Such flaps are also called as Chinese flap. Free forearm flap of superficial ulnar artery is very popular among plastic surgeons.<sup>[6]</sup> The brachial and ante-brachial arteries are also the arteries of choice in treatment for chronic renal failure (CRF) for dialysis by making an autogenous fistula and they are first choice of the treatment for dialysis, because they last longer and need less maintenance.<sup>[2]</sup>

Various authors have studied variations of brachial artery. The frequency of brachial artery anomalies has been reported as 5.5% cases by one of the authors, 7.5% by other authors in the Turkish population. The incidence varies between 7.5% and 18.5% in the literature. A case of termination of brachial artery at its commencement below the lower border of teres major has been reported.<sup>[8]</sup> In the present study the variations of brachial artery were found in three cases, which is 6% of the 50 limbs dissected. In the present study the profundabrachii artery originated from 3rd part of axillary artery, in one instance of 50 limbs dissected (2%).

In the present study the radial artery was observed to arise from 2nd part of axillary artery in one specimen out of 50 limbs dissected (2%). High origin of radial artery has been reported to occur in 14.27% of individuals,<sup>[9, 10]</sup> and may arise as high as the axillary artery, but most commonly it arises at the level of proximal one third of arm. A high origin of radial artery is the commonest vascular pattern variation of upper extremity. A case of high origin of radial artery from 3rd part of axillary artery proximal to the two root of median nerve has been reported in a study<sup>[11]</sup> and another study found radial artery originated from the axillary artery on both

sides in a cadaver<sup>[12]</sup> One study reported an incidence of axillary artery giving origin to radial artery bilaterally in a Nigerian cadaver.<sup>[13]</sup>

In our study early bifurcation of brachial artery was found in the middle of the arm in 1 out of 25 cadavers. High division of the brachial artery was found in only 0.5% in 202 cadavers dissected, in a study involving 72 upper limbs of Brazilian adult cadavers. The bifurcation of the brachial artery was found above bicondylar line in 11.1% cases.<sup>[14]</sup> High division of Brachial artery in proximal third of arm was found in 3 cases out of 60 specimens.<sup>[15]</sup> another study also documented a case of early division of brachial artery in the middle of right arm into radial and ulnar artery.<sup>[16]</sup> An unusually short segment of brachial artery with bifurcation proximal to the level of insertion of coracobrachialis was noted in 2 out of 20 cadavers.<sup>[17]</sup> High division of Brachial artery with upper course of radial artery was found in 3 cases out of 48 cadavers in a study.<sup>[18]</sup> (Table 1 & 2)

**Table 1: Length of arteries of Upper Limb.**

	Rt. Upper limb		Lt. Upper limb	
	Mean (cms)	S.D.	Mean (cms)	S.D.
Brachial arterv	22.36	2.98	23.03	0.86
Radial arterv	23.35	5.15	22.18	0.52
Ulnar arterv	23.20	0.48	23.23	0.44

**Table 2: Length of arteries in 25 cadavers in comparison to male (20) and female (5).**

Artery	Left upper limb			Right upper limb		
	Min	Max	Mean & S.D.	Min	Max	Mean & S.D.
Length in male cadaver in cms						
Brachial arterv	21.2	24.5	23.04±0.89	8.6	24.3	22.22±3.32
Radial arterv	21.3	22.9	22.09±0.52	21	36.4	22.77±3.28
Ulnar arterv	22.5	24.1	23.24±0.46	22.4	24.2	23.24±0.51
Length in female cadaver in cms						
Brachial arterv	21.6	24	22.98±0.88	21.8	23.8	22.98±0.80
Radial arterv	21.5	22.9	22.02±0.63	21.3	44.2	26.58±9.87
Ulnar arterv	23	24.2	23.46±0.45	22.8	24.2	23.34±0.45

## CONCLUSION

Knowledge of the brachial artery and its variations is of clinical and surgical importance. It is prudent to do pre-operative studies of the brachial and ante brachial arteries and their branching patterns, to prevent possible complications post operatively.

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