

Anomalous Branching Pattern Of The Axillary Artery

Santosh.V.Shinde*, S.D.Jadhav*, B. R. Zambare**, S.E.Pawar***

* Associate Professor, ** Professor & HOD, *** Professor, Dept of Anatomy, PDVVPF'S Medical College and Hospital, Ahmednagar

Abstract : In routine dissection of upper extremity, in a 70yrs old male cadaver, we found the abnormal branching pattern of the third part of axillary artery on the right side. The third part of axillary artery divided into medial and lateral trunks. The medial trunk is referred to as deep brachial artery and lateral trunk is referred to as superficial brachial artery. The superficial brachial artery continues as brachial artery in arm and finally in cubital fossa divides into radial and ulnar arteries. The deep brachial artery at its origin was trapped by two roots of median nerve and later divided in to Subscapular artery, Anterior circumflex humeral artery, Posterior circumflex humeral artery and profunda brachii artery. The branching pattern of the axillary artery was normal on left side. This variation is important for surgeons for lymphectomies, to anesthesiologist and orthopedic surgeons considering the frequency of procedures done in this region. [Shinde S et al NJIRM 2013; 4(3) : 162-165]

Key Words: Axillary artery, Brachial artery, Subscapular artery.

Author for correspondence: Dr. Santosh.V.Shinde, Associate Professor, Dept. of Anatomy, P.D.V.V.P.F's Medical College & Hospital, Ahmednagar, 414111. Email: - santoshvshinde15@yahoo.co.in

Introduction: Axillary artery is the direct continuation of the Subclavian artery at the outer border of the first rib. The course of the axillary artery is anatomically divided into three parts by the pectoralis minor muscle. The first part begins at the lateral border of the first rib and extends to the superomedial border of the pectoralis minor muscle. The first part is enclosed within the axillary sheath along with the axillary vein and brachial plexus. The second part lies deep to the pectoralis minor muscle and the third part lies between the inferolateral border of the pectoralis minor and the inferior border of the teres major muscle .

The axillary artery is usually gives off six branches. The first part of the artery gives superior thoracic artery. The second part gives lateral thoracic and thoracoacromial branches. The third part gives subscapular artery, anterior and posterior circumflex humeral arteries¹.

There is extensive collateral circulation associated with the branches of subclavian and axillary arteries particularly around scapula so that the sound knowledge of neurovascular variation is important for surgeons for lymphectomies, to anesthesiologist and orthopedic surgeons considering the frequency of procedures done in this region. It is very common to find the variations in the branching pattern. Sometimes many of the branches may originate from a common stem or they may arise separately².

Materials And Methods : Axillary arteries belonging to 48 upper limbs of 24 cadavers (20 males & 4 females) of the Department of Anatomy, P.D.V.V.P.F.'S Medical College, Ahmednagar comprised the material for the study. These limbs were dissected retaining continuity with the trunk. Exposure of axillary artery and its branches was achieved following classical incisions and dissection procedures taking care to preserve all the branches of the axillary artery. Variations were observed and recorded.

Observation : In routine dissection of upper extremity, in a 70yrs old male cadaver we found the abnormal branching pattern in the third part of axillary artery on the right side. The third part of axillary artery divided into medial and lateral trunks. The medial trunk is referred to as deep brachial artery and lateral trunk is referred to as superficial brachial artery (Figure 1.1)^{3,4}. The superficial brachial artery continued as brachial artery in arm and finally in cubital fossa divided into radial and ulnar arteries (Figure 1.2).

The deep brachial artery at its origin was trapped by two roots of median nerve (Figure 1.3) and later divided in to Subscapular artery, Anterior circumflex humeral artery, Posterior circumflex humeral artery and profunda brachii artery (Figure 1.4). The Subscapular artery passes downwards laterally posterior to median nerve and radial nerve along the lower border of the Subscapularis muscle and at the inferior angle of the scapula

divided into branch to latissimus dorsi and circumflex scapular artery. The Anterior circumflex humeral artery passed laterally in front of intertubercular sulcus of the humerus and anastomosed with posterior circumflex humeral artery. The Posterior circumflex humeral artery is much larger than Anterior circumflex humeral artery, runs backwards through quadrangular intermuscular space and ends by anastomosing with Anterior circumflex humeral artery. The profunda brachii artery runs downwards along with radial nerve through lower triangular space and then in radial groove and divides in to anterior descending, posterior descending, ascending branch and nutrient artery.

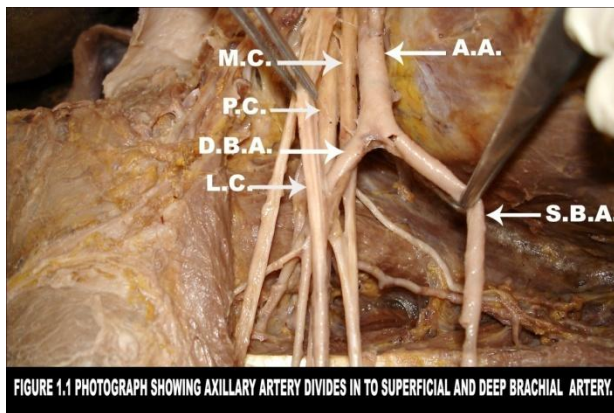


FIGURE 1.1 PHOTOGRAPH SHOWING AXILLARY ARTERY DIVIDES IN TO SUPERFICIAL AND DEEP BRACHIAL ARTERY.
A.A. – Axillary Artery. S.B.A. – Superficial Brachial Artery. D.B.A. – Deep Brachial Artery. L.C. – Lateral cord of Brachial plexus. M.C. – Medial cord of Brachial plexus. P.C. – Posterior cord of Brachial plexus.

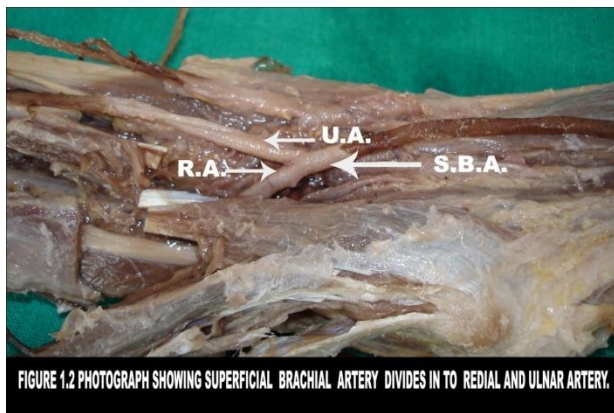


FIGURE 1.2 PHOTOGRAPH SHOWING SUPERFICIAL BRACHIAL ARTERY DIVIDES IN TO RADIAL AND ULNAR ARTERY.
S.B.A. – Superficial Brachial Artery. U.A. – Ulnar Artery R.A. – Radial Artery

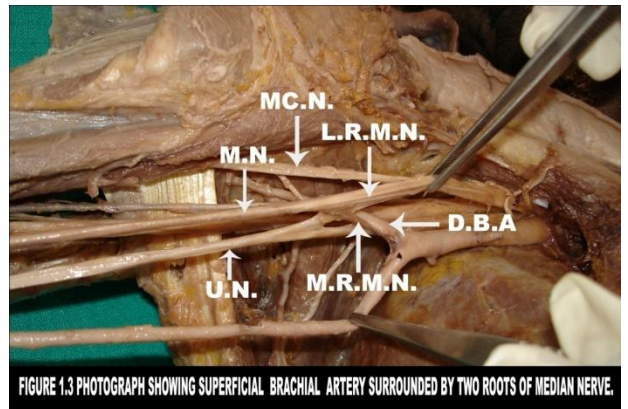


FIGURE 1.3 PHOTOGRAPH SHOWING SUPERFICIAL BRACHIAL ARTERY SURROUNDED BY TWO ROOTS OF MEDIAN NERVE.
L.R.M.N. – Lateral root of median nerve. M.R.M.N. – Medial root of median nerve. M. N. – Median Nerve. MC.N. – Musculo-cutaneous Nerve. U.N. – Ulnar Nerve.

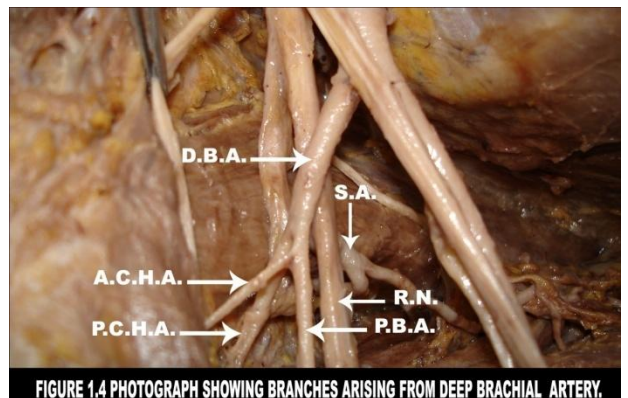


FIGURE 1.4 PHOTOGRAPH SHOWING BRANCHES ARISING FROM DEEP BRACHIAL ARTERY.
D.B.A. – Deep Brachial Artery. A.C.H.A. - Anterior circumflex humeral artery. P.C.H.A. - Posterior circumflex humeral artery. P.B.A. – Profunda brachii artery S.A. – Subscapular artery R.N. – Radial Nerve.

The branching pattern of the first and second part of artery was normal. The axillary vein anteromedial to axillary artery. In the cords of brachial plexus the deep brachial artery was trapped between two roots of median nerve and then median nerve passed along with superficial brachial artery. Musculocutaneous nerve was lateral to deep brachial artery. Ulnar nerve was medially and Axillary nerve was posterior to superficial brachial artery. The branching pattern of the axillary artery normal was on left side.

Discussion : The branches of the axillary artery vary considerably in different subjects.

Occasionally the subscapular, circumflex humeral, and profunda brachii arteries arise from a common trunk, and when this occurs, the branches of the brachial plexus surround this trunk instead of the main vessel. Sometimes the axillary artery divides into the radial and ulnar arteries, and occasionally it gives origin to the volar interosseous artery of the forearm⁵.

The upper limb arteries develop in five stages. An axial arterial pattern represented in the adult by axillary artery, brachial artery and interosseous artery of the forearm develops first while other branches develop later from the axial system. In the later stages the median artery branches from the anterior interosseous artery and the ulnar artery branches from the brachial artery respectively. In the further course of development a superficial brachial artery arises from the axillary artery and it continues as radial artery. Regression of the median artery and an anastomosis between the brachial artery and superficial brachial artery with regression of the proximal segment of the latter gives rise to the definitive radial artery. The anomalies can be explained by the persistence of embryological vessels. Genetic influences are deemed to be prevalent causes of such variation, although factors like fetal position in utero, first limb movement or unusual musculature cannot be excluded⁶.

Common variations in literature:

The major variations of the axillary artery are: Occasionally, it gives rise to the radial artery or, more rarely, to the ulnar artery. Still more rarely, it gives rise to the interosseous artery or a vas aberrans. It may give rise to a common trunk from which may arise the subscapular, anterior and posterior circumflex humeral, profunda brachii, and ulnar collateral arteries. The branches of the brachial plexus may surround this common trunk not the main brachial artery⁷.

The first part of the axillary artery may also provide an accessory thoraco-acromial artery. The third part of the axillary artery is occasionally covered by a muscular slip (an axillary arch muscle) derived from the upper part of the tendon of latissimus

dorsi. Unusual branches of the axillary include a glandular artery to lymph nodes and skin of the axilla (so called alar thoracic artery) and an accessory lateral thoracic artery⁷.

A common trunk from second part of the axillary artery was reported by Kumar. Bhat⁸ in 2008. which gave rise to muscular branches to pectoralis major and deltoid, lateral thoracic artery, subscapular artery and thoracoacromial artery. In the variation reported by VijayaBhaskar³ in 2006 the third part of the axillary artery divided into superficial brachial and deep brachial arteries. The superficial brachial artery continued in the arm without giving any branches and ended in the cubital fossa dividing into radial and ulnar arteries. The deep brachial artery gave rise to subscapular, profunda brachii, articular branch to the shoulder joint, anterior circumflex humeral artery and posterior circumflex humeral artery.

Therefore the variation observed in this case will be of clinical use in the following instances: In performing a brachial plexus block, it is important to feel the pulsation of the axillary artery before performing it. In such variation the relation of the artery to the brachial plexus may be disrupted causing difficulty in the procedure. Also such arterial variations may put the artery at risk of injury during a central venous cannulation into the subclavian vein in which usually the subclavian artery is at risk.⁹

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Conflict of interest: None

Funding: None
