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A CASE REPORT ON VARIANT BRANCHING PATTERN OF AXILLARY ARTERY

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ABSTRACT

During routine dissection for first M.B.B.S. students on 65 year donated embalmed male cadaver in the Department of Anatomy, K. J. Somaiya Medical College, I encountered variations termination of axillary artery on left side. The axillary artery, at the level of the lower border of Teres Major muscle divided into radial and ulnar arteries. The radial artery continued downward just like the brachial artery and at the level of neck of radius gave out a common interosseus branch. The radial artery performed the role of brachial artery in the arm. It gave rise to all branches which are usually given by brachial artery. It gave Profunda brachii, muscular and anastomotic collateral branches. The ulnar artery continued on the medial side of the branch without giving any branches. From the level of the neck of radius, its course was normal. The termination of axillary artery was normal on the right side of the same male cadaver. The photographs of the variations of axillary artery were taken for proper documentation and for ready reference. Conclusion: Topographical anatomies of the normal and abnormal variations of the axillary artery are clinically important for surgeons, orthopaedicians and radiologists performing angiographic studies on the upper limb. The appropriate diagnostic interpretation and therapeutic intervention can be achieved on the basis of knowledge of such variations.

Key words: Axillary Artery, Radial Artery, Ulnar Artery, Common Interosseus Artery, Angiographic Studies, Radiologists, Orthopaedicians, Shoulder Joint.

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INTRODUCTION

The axial artery of the upper limb is derived from the lateral branch of the seventh cervical intersegmental artery. This axial artery becomes axillary, brachial, radial and ulnar arteries on further development. At the level of the outer border of the first rib the subclavian artery continues as the axillary artery. The axillary artery ends at the level of the lower border of the teres major muscle and continues downwards as the brachial artery.

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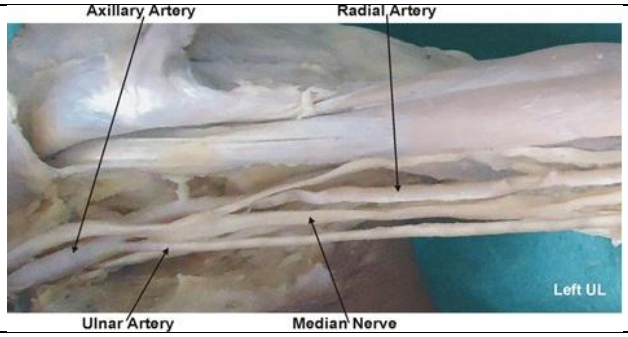
The brachial artery is the main artery of the arm. Brachial artery which is the main arterial supply to the arm ends in the cubital fossa, at the level of the neck of the radius by dividing into radial and ulnar arteries. Radial artery appears as a direct continuation of the brachial artery while the ulnar artery shows a slight medial convexity [**1].** The branches of subclavian and axillary arteries show extensive collateral circulation around the scapula so that the sound knowledge of neuromuscular variation is important for surgeons who remove the axillary lymph nodes, to anaesthesiologist and orthopaedic surgeons considering the frequency of procedures done in this region. Sometimes many of the branches may originate from a common stem or arise separately [2]. These

variation, are well documented in literature. Variations are common in the branching pattern of the third part of the axillary artery. A common arterial trunk may give rise to the scapular artery and the posterior circumflex humeral artery or it may give rise to subscapular, anterior and posterior circumflex humeral and profunda brachii arteries. The profunda brachii artery rarely gives the posterior circumflex humeral artery which will pass below the teres major muscle and not through the quadrangular space. The axillary artery may give rise to high origin of radial and ulnar arteries and rarely the anterior interosseous artery may arise from axillary artery.

CASE REPORT

During routine dissection for the undergraduate medical students, I observed the variations termination of axillary artery in the left upper limb of a 65 year old donated embalmed male cadaver in the Department of Anatomy, K. J. Somaiya Medical College, Sion, Mumbai, INDIA. In the present case, the axillary artery, at the level of the lower border of Teres Major muscle divided into radial and ulnar arteries. The radial artery continued downward just like the brachial artery and at the level of neck of radius gave out a common interosseus branch. The radial artery performed the role of brachial artery in the arm. It gave rise to all branches which are usually given by brachial artery. It gave Profunda brachii, muscular and anastomotic collateral branches. The ulnar artery continued on the medial side of the arm without giving any branches. From the level of the neck of radius, its course was normal. The termination of axillary artery was normal on the right side of the same male cadaver. The photographs of the variations of axillary artery were taken for proper documentation and for ready reference.



DISCUSSION

Variations in the arterial pattern of the upper limb are commonly found in literature. Bergman R.A. et al, Rodriguez - Baeza A. et al and Tountas C.H.P.et al have reported variations in the branching pattern of the axillary artery [2, 3, 4]. According to Jurjus A. et al the variations and anomalies of the arterial system of the upper limb can be best explained on the basis of embryologic development of the vascular plexuses of the limb buds [5]. Senior H. D. and Singer E. have proposed the model of development of the arteries of upper limb. According to them arterial development begins with the appearance of an axial artery followed by other branches. The axial artery forms axillary artery, brachial artery and anterior interosseous artery. The median artery branches from the anterior interosseous artery. The ulnar artery arises from the brachial artery. The axillary artery gives a superficial brachial artery which continues as the radial artery [6, 7]. According to Tan C.B. et al the variations in the origin, course and distribution of the axillary artery are not common [8]. Jurjus A. R. et al stated that the axillary artery is the axial artery of upper limb derived from the the lateral branch of the seventh cervical intersegmental artery [9]. Hamilton W. J. et al documented that the arterial variations in the upper limb are due to the defects in the embryonic development of the vascular plexus of the upper limb bud. This may be due to arrest at any stage of development, showing regression, retention, or reappearance and may lead to variations in the arterial origins and courses of the major upper limb vessels [10]. According to Cavdor et al the axillary artery is having two distinct variations one is the high origin of the superficial brachial artery which emerges from the axillary or brachial artery and continues in the forearm as the radial artery. Second is the superficial brachial artery may or may not be a brachial artery terminating in to radial and ulnar arteries. The incidence of such superficial brachial artery is around 0.1- 3.2% as available in the literature [11]. De Garis C.F. has observed the division of the axillary artery into superficial and deep brachial arteries more frequent in black persons (13.4%) than in white persons (4.6%) [12]. In the present case the axillary artery divides in to superficial brachial artery and deep brachial artery. The superficial brachial artery has not given any branches during its course in the arm. It terminated in to the radial and ulnar arteries and the arterial arches of the hand were normal. The deep brachial artery giving rise to all branches which are normally given by the axillary artery is very rare and no such case report is available in literature. The deep brachial artery first gave superior thoracic, thoracoacromial, lateral thoracic artery & articular branch to the shoulder joint. It then divided into anterior & posterior division. The anterior division gave rise to

anterior circumflex humeral, posterior circumflex humeral and profunda brachii artery. The posterior division i.e. subscapular artery gave rise to circumflex scapular and thoracodorsal artery. According to Charles et al there are 7 types of origins for profunda brachii artery.

In Type I the profunda brachii artery is the branch of brachial artery,

Type Ia the profunda brachii artery originates by 2 separate branches,

Type Ib the profunda brachii artery originates by 3 separate branches,

In Type II the profunda brachii artery arises as a common trunk with superior ulnar collateral artery,

In Type III the profunda brachii artery arises at lower border of teres major so can be considered to be arising from axillary or brachial,

In Type IV profunda brachii artery is the branch of 3rd part of axillary artery.

In Type V profunda brachii artery arises as a common trunk with posterior circumflex humeral.

In Type VI profunda brachii artery arises as a common trunk with subscapular and both circumflex humerals from axillary artery and in

Type VII profunda brachii artery is absent [13]. In the present case the profunda brachii artery arises from the anterior division of the deep brachial artery along with anterior circumflex humeral and posterior circumflex humeral arteries which is rare and not found in literature. The arterial variations documented in the present case are due to the defects in the embryonic development of the vascular plexus of the upper limb bud. This may be due to arrest at any stage of development, showing regression, retention, or reappearance and may lead to variations in the arterial origins and courses of the major upper limb vessels [10]. The embryological correlation of the variations of the course and distribution of axillary artery seen in present case may be by the persistence, disappearance, incomplete development fusion and absorption of vessels and the selection of unusual path by primitive vascular plexuses [14]. According to Decker G.A. G. the knowledge of such variations are important while operating on chronic dislocation of the shoulder joint. The orthopaedicians must take precautions while taking transverse incision in order to avoid injury to the deep brachial artery and its branches [15]. Yoshinaga K. et al in his study on "A rare variation in the branching pattern of the axillary artery." concluded that an accurate knowledge of the normal and variant arterial pattern of the human upper extremities is important both for reparative surgery and for angiography [16]. According to Samuel L. the presence of deep brachial artery and its branches must be kept in mind during the surgical repair of brachial plexus injury in order to prevent bleeding [17].

Clinical Significance

The case reported here may be of significance to angiologists, radiologists as well as physicians, surgeons, especially traumatologists and vascular surgeons. The finding has a clinical relevance considering the frequency of procedures in this region. Some examination, such as color Doppler imaging of arteries in upper extremity even arterial angiography, may be performed before cardiac catheterization or coronary artery bypass surgery.

CONCLUSION

The arterial variations of the upper limb have been implicated in different clinical situations. The variations in the origin and course of principal arteries are clinically important for surgeons, orthopaedicians and radiologists performing angiographic studies on the upper limb. Therefore both the normal and abnormal anatomy of the region should be well known for accurate diagnostic interpretation and therapeutic intervention.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

STATEMENT OF HUMAN AND ANIMAL RIGHTS

All procedures performed in human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

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