Abnormal Division of Axillary Artery - A Case Report

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ABSTRACT

A case of the abnormal branching of the right Axillary artery in a 60 year old male cadaver is presented here. The axillary artery divided into two trunks, a lateral and medial from the second part only in this case. The lateral branch was superficial running between two roots of median nerve, which here is referred to as superficial branch. The other was a medial trunk, running deep to median nerve on the medial, hence it is referred as deep brachial artery. The superficial branch had a similar course as radial artery coursing on the lateral side of cubital fossa, fore arm, anatomical snuff box and hand, hence it was considered as equivalent to radial artery. The deep brachial artery gave rise to anterior and posterior circumflex humeral arteries and the superior ulnar collateral artery. This variation is rare and the incidence quoted as around 0.12 - 3.2% in the available literature. The normal and abnormal anatomy of the axillary artery is having practical importance for the radiologists during angiography and surgeons for accurate diagnostic interpretation.

Key words: Axillary artery, subscapular artery, brachial artery, profunda brachii artery.

INTRODUCTION

The axillary artery is the continuation of the subclavian artery at the outer border of the first rib and ends at the distal border of teres major and continues in the arm as the brachial artery. The pectoralis minor muscle crosses it anteriorly and divides into three parts. Proximal (first) posterior (second) and distal (third) to the muscle. The axillary artery is conveniently described as giving off six branches: the first part gives rise to one branch (superior thoracic artery), the second part to two branches (thoraco acromial and lateral thoracic artery), and the third part to three branches (subscapular, anterior circumflex humeral and posterior circumflex humeral arteries). This study reports a case of higher division of axillary artery at the second part itself and the absence of subscapular and profunda brachii arteries.

CASE REPORT

During the routine dissection classes of the upper limb, in the department of Anatomy, at MNR Medical College, Sangareddy Andhra Pradesh, a 60 year male cadaver showed unilateral variation in branching pattern of right axillary artery.

OBSERVATIONS

During dissection of this cadaver we found an unusual branching in the second part of the axillary artery on the right side, where the course and distribution of the first part on the same side was found to be normal. The axillary artery on the left side showed usual pattern.

The anomalies found include (See figs 1-4):

The second part of the axillary artery on the right side divided into two branches, a lateral and medial. The lateral branch was a superficial branch running between the two trunks of median nerve, refer to it here as the superficial brachial artery. The other medial trunk is running deep to median nerve on the medial side hence it is referred as the deep brachial artery. The diameter of the ulnar artery (deep brachial artery) was larger compared to the radial artery (superficial brachial artery). Further observation showed that there was absence of the subscapular artery and of profunda brachii artery. The following branches are given from medial or deep brachial artery: they are anterior circumflex humeral, superior ulnar collateral and inferior ulnar collateral arteries. These branches arose from the common trunk,
Fig 1. Showing the unusual branching of the 2nd part of Axillary artery. 1st AA - 1st part of Axillary artery; 2nd PP - 2nd part covered by pectoralis minor; 3rd U & RA - 3rd part division of ulnar & radial artery.

Fig 2. Showing lateral and medial branches of Axillary artery and their relations with LR of MN - lateral root of median nerve; MR of MN - medial root of median nerve.

Fig 3. Showing relation of lateral and medial roots of median nerve (LR of MN and MN) and musculocutaneous nerve (MCN) to radial artery (RA) and ulnar artery (UA).

Fig 4. Showing ACHA - anterior circumflex humeral artery; PCHA - posterior circumflex humeral artery given from ulnar division and absence of subscapular artery.

The distribution was usual and no other branch of any other artery supplemented the absence of profunda brachii and the subscapular arteries. The lateral brachial artery had no branches in the arm and it had similar course to radial artery on lateral side of cubital fossa, fore arm, snuff box, and hand hence it is referred to as radial artery.

**DISCUSSION**

Anatomical variations in the major arteries of upper limb have been reported. These include an abnormal trunk taking origin from second part of the axillary artery. Absence of subscapular artery and profunda brachii artery. Cases of this kind should be examined and operated carefully during surgical or electro physiological procedures.

Wollard\(^1\) was the first person to observe development of arterial stems in the fore limb of the pig. Anson\(^2\) has observed a common trunk giving off superior ulnar collateral artery with posterior circumflex humeral artery in a number of cases. Cavdar et al.\(^3\) have observed (in a Turkish male cadaver on the right upper limb.) that the superficial artery in high division of the axillary artery is usually designated as high origin of the radial artery. However the axillary artery is having two distinct variations. The high division of the axillary artery
emerges from the axillary artery or brachial artery and continues in the fore arm as the radial artery, where as the superficial brachial artery may or may not be a brachial artery in the sense of giving rise to radial and ulnar arteries such cases are very rare and incidence reported is around 0.1-3.2%.

De Garis and Swartley have compared the axillary artery in the white and negroes, and found the variations are more in negro population (13.4 %) compared to the white (4.6 %). Fuss et al, found anatomic variations in the major arteries of the upper limb. These include the presence of superficial brachial artery, as well as a superficial ulnar artery, Cases of this kind should be examined carefully before operation. Hamilton, Boyd and Mossman have stated that the arterial anomalies in the upper limb are due to defects in the embryonic development of the vascular plexus of the upper limb bud. This may be due to arrest at any stage of the development, showing regression, renstion, or reappearance and may lead to variations in the arterial origins and courses of the major upper limb vessels.

A number of authors have reported the variations of the vasculo nervous elements of the human axilla including the variations in the subclavian and axillary arterial system. Mc Comarck, Caulewell and Anson have observed the brachial and antebraclial arterial patterns in 750 extremities in their study. Nakatani et al, have reported a case of superficial ulnar artery originating from the brachial artery and have correlated its clinical importtance. Poteat has reported a case of complete absence of radial artery. Samuel et al, have reported a case of the 3rd part of the axillary artery giving a common arterial trunk, which further gave anterior and posterior circumflex humeral, subscapular, radial collateral, middle collateral and superior ulnar collateral arteries with the absence of profunda brachii artery. The present case report differs from the above report in branching pattern and course of these branches. High origin of radial artery and ulnar artery forms the highest percentage of variations of brachial artery, according to many authors. High origin of radial artery is known to occur in 14.27% individuals; according to Anson in 15%, 7.7% according to Degaris and Swartly. Tan et al, have reported an unusual course and relation of the human axillary artery. Venieratos et al have reported abnormal ramification of the axillary artery, subscapular common trunk. Vijaybhaskar et al have reported, recently case of a 50 year male cadaver showing unilateral variation in the branching pattern of the third part of axillary artery.

In the present case an abnormal trunk originated from the second part of the axillary artery and gave rise to an anterior and posterior circumflex humeral arteries, superior and inferior ulnar collateral arteries associated with complete absence of sub scapular and profunda brachii arteries. The relations of the two roots of median nerve is important, where the lateral branch is superficial and running between them. The median trunk is deep to median nerve on its medial side. Normally subscapular artery is the large branch from third part of axillary artery, whose branch circumflex subscapular artery is again a large branch which participates in the anastomosis around the scapula. This anastomosis is between subclavian artery and axillary artery. The profunda brachii artery is a large branch from posteromedial aspect of brachial artery beyond teres major. It follows radial nerve closely, first between the long and medial heads of triceps, then in the spiral groove covered by lateral head of triceps. It supplies muscular branches, nutrient artery of humerus and finally divides into terminal radial and middle collateral branches.

Normally, in embryos of 11mm length, the seventh cervical intersegmental artery enlarges and becomes dominant vessel of axilla. C6 C7 and T1 segmental arteries and most of the longitudinal anastomosis that
link up intersegmental arteries degenerate slowly. The numerous alternatives that exist during the formation of upper limb vessels, seem to be responsible for anomalous arterial branching pattern, which may be a cause of concern for the vascular radiologists, surgeons and may lead to complications in surgeries involving axilla and pectoral regions.

CONCLUSION
The knowledge of these variations are necessary for the surgeons considering the frequency of procedures performed in this region. The absence of branches from second and third part of axillary artery and subscapular, and profundabrachii, may be responsible for compromised collateral circulation between the branches of the first part of subclavian and the branches from the third part of axillary arteries. In case of block in the axillary artery beyond the first part, during surgeries in pectoral region and axilla, such anomalous branches ought to be kept in mind by the surgeons. The increase in use of diagnostic and interventional procedures in cardiovascular diseases makes it important that the type and frequency of vascular variations are well documented and understood. Branches of the upper limb have been used for coronary bypass and flaps in reconstructive surgery. Thus an accurate knowledge of normal and variant arterial pattern of the human upper limb is important for both angiography and reparative surgery.

REFERENCES

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