Rare Variation of Axillary Artery and its Clinical Significance

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ABSTRACT:
Axillary artery pulsations serve as a landmark for clinical procedures like brachial plexus block and subclavian vein puncture. Axillary artery is also increasingly being utilized as a graft for coronary artery bypass. The present article reports a rare case of axillary artery variation. In this case, gross deviation from the normal anatomy was observed in an adult embalmed cadaver. Axillary vein arched over the second part of axillary artery and then continued posterior to the artery throughout its course. A variant relationship of brachial plexus cords and branches to the artery was also observed. All the cords and their branches were posteriosuperior to the axillary artery in abducted position of arm. The immediate posterior relation of axillary artery in its second and third part was axillary vein and ulnar nerve.

This variation may have important clinical implications while performing subclavian vein puncture for central venous line and brachial plexus blocks. Knowledge of such variations is also important in interpreting images and in carrying out surgical and anaesthetic procedures involving axillary artery.

KEY WORDS: Axillary artery, axillary vein, brachial plexus, brachial plexus block, subclavian vein

INTRODUCTION:
Standard textbooks of Anatomy describe axillary artery extending from outer border of first rib up to the lower border of teres major muscle. This artery is closely surrounded by important neurovascular structures namely, brachial plexus cords, their branches and the axillary vein. Axillary artery enjoys a relatively constant relationship with the surrounding neurovascular structures. Variations in branching pattern of axillary artery are quite common. Ample literature is available describing divergent patterns of branching viz. different branches arising from common trunk; absence of one or multiple branches; origin of branches from one of its branches. These variant branches often take a deviant course to reach to the region supplied by them.

Subclavian vein puncture and brachial plexus blocks via the ‘supraclavicular’ and ‘axillary’ approaches are established clinical procedures. These procedures require thorough knowledge of normal and variant relationship of axillary artery with the vein and the brachial plexus. Recent clinical literature suggests that utilization of axillary artery graft for coronary artery bypass is a safe and effective procedure. Axillary - axillary artery bypass is also becoming treatment of choice in subclavian artery occlusive diseases. The normal and variant anatomy of the axillary artery thus assumes significance especially with regards to its course and relations with the neurovascular structures.

The present case is unique because it describes an unreported variant course and relations of axillary artery along with its variant branching pattern.

CASE REPORT:
A rare variation of axillary artery was observed during routine dissection in the left upper limb of an adult embalmed male cadaver in the Department of Anatomy, All India Institute of Medical Science, Bhopal. The variations were observed in the course, relations...
and the branching pattern of the axillary artery. No variation was observed on the contralateral side.

**Variant course and relations of axillary artery:** The artery in its second and third part had a gentle sinuous (like the letter ‘s’) course even in abducted position of the arm. This was further accentuated when the arm was adducted. The axillary vein arched over second part of the axillary artery and then continued posterior to it. A variant relationship of the brachial plexus cords and the branches was also observed. All the cords and their branches were posterio-superior to the axillary artery in abducted position of arm. The immediate posterior relations of the axillary artery in the second and the third part were the axillary vein and the ulnar nerve [Figure 1].

Figure 1: Showing sinuous course of axillary artery. Variant relationship of the axillary artery with the brachial plexus and the axillary vein is seen. The axillary vein is seen arching over and coursing posterior to the artery. The brachial plexus cords and branches are seen posterosuperior to the artery in abducted position of arm. Ulnar nerve is seen coursing posterior to the artery. AA= axillary artery; AV= axillary vein; CB= coracobrachilis muscle; CL= clavicle; PM= pectoralis minor muscle; SA= scalenus anterior muscle; UN = ulnar nerve.

Figure 2: Showing variant branching pattern of the axillary artery. B1 represents common trunk and B 2, 3, 4 represent successive unnamed branches of axillary artery. AA= axillary artery; ACH= anterior circumflex humeral artery; CB= coracobrachilis muscle; CL= clavicle; PCH=posterior circumflex humeral artery; PM= pectoralis minor muscle; SA= scalenus anterior muscle; SS= subscapular artery.
Variations in branching pattern: The first and the third part of axillary artery had no branches. All the branches arose from the second part of the artery. A common trunk (B1) was the first branch of the artery. A slender branch from this common trunk coursed towards acromion process. The common trunk coursed between the lateral and posterior cords to reach the neck of humerus where it trifurcated into anterior and posterior circumflex humeral artery and subscapular artery. Three other unnamed branches originated from the second part (B2, B3, B4) [Figure 2]. One of them coursed towards the anterior part of pectoral region and the other two coursed towards the lateral part of pectoral region.

DISCUSSION:

The variability of branching pattern of axillary artery has been observed and reported by several studies and case reports. Gross deviation from normal description, as observed in this rare case, can be clinically important and noteworthy for clinicians. However, branches arise as outgrowth from vessels. Such outgrowth is patterned, and follows some guiding factors. Occasional variability in the branching pattern of arteries can be ascribed to alteration in these factors.

The deviant neurovascular anatomy observed in present case has not been previously reported in available literature. The only other reported case of a sinuous course of axillary artery was described by Tan and Tan (1994). They reported a sinuous axillary artery coursing superficial to pectoralis minor muscle.Embryologically, the seventh cervical intersegmental artery forms the axillary, brachial and anterior intersegmental arteries of the upperlimb. The anomaly could have arisen due to abnormal rate of growth and development, or failure of absorption during the formation of the limbs, resulting in redundancy of the artery.

Axillary artery pulsations serve as an important landmark in brachial plexus blocks. In this procedure, the axillary artery is palpated with the arm abducted at right angles to the body and the injection is made at the highest point in the axilla where the pulsations of the axillary artery can be felt. Disturbed relationship with brachial plexus, may lead to partial failures of brachial plexus blocks using the axillary artery approach. As in the case the vein lies posterior to the artery, there is a possibility of accidental introduction of anaesthetic agent into the vein during such procedures.

Thus, examinations of images obtained in cases of unusual and complicated variations of vascular pattern of the axillary artery may lead to confusion in interpretation of data. Variant relationship of the axillary artery to the axillary vein (vein lying posterior to the artery) may cause injury to the axillary artery during subclavian vein puncture. The technique involves inserting the catheter through a skin incision about 2 cm below the midclavicular point. The terminal part of axillary vein is utilized to introduce the catheter. Normally the vein lies anteroinferior to the axillary artery and so poses no risk of arterial puncture. Accidental entry of the catheter into the subclavian artery would be one of the complications of this technique. The axillary artery and brachial plexus may be injured, if the patient presents with this rare anomaly described above.

CONCLUSIONS:

Knowledge of occasional variation in the course, relation and branching pattern of axillary artery is important in interpreting images and in carrying out surgical procedures like subclavian vein puncture and anesthetic procedures like brachial plexus blocks involving axillary artery.

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