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Research Paper

Rare and Bilateral Variant Common Trunk from The Axillary Artery – A Case Report

Medical Science

KEYWORDS : Axillary artery, common trunk, seventh intersegmental artery, Subscapular artery, vascular endothelial growth factor.

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ABSTRACT

Accurate information regarding the arterial variations of the upper limb is significant during vascular, reconstructive and orthopedic surgeries and during evaluation of angiographic images. A bilateral variation in the branching pattern of axillary artery was observed during the routine dissection classes in the Department of Anatomy at Maulana Azad Medical College on a 40-year old female cadaver. On right side, a common trunk took origin from the second part of the axillary artery which divided into lateral thoracic and subscapular artery. Posterior circumflex humeral artery took origin from subscapular artery and coursed around the neck of humerus along with axillary nerve. In the left axilla, a common trunk took origin from the third part of the axillary artery which in turn gave origin to lateral thoracic and subscapular artery. Arterial anomalies in the upper limb are due to defects in embryonic development of the vascular plexus of upper limb bud.

INTRODUCTION

Arterial variations in the upper limb have been the subject of much controversy since Von Haller mentioned their existence for the first time in the eighteenth century[1]. Many of the branches of axillary artery may arise by a common trunk or a branch of the named artery may arise separately[2]. Knowledge of such variations is important for anatomists, radiologists, cardiologists, orthopedic and reconstructive surgeons and especially, vascular specialists. It is especially relevant in cases of arteriovenous fistulae, aneurysms and abscess drainage in region of axilla, arm and cubital fossa[3]. Awareness of abnormal axillary vasculature is crucial in use of superficial brachial artery flap in plastic surgery[4] and protection of axillary artery in breast cancer surgery[5].

Axillary artery is the direct continuation of the subclavian artery extending from the outer border of the first rib to the lower border of the teres major muscle, where it continues as the brachial artery. The course of the axillary artery is anatomically divided into three parts by the pectoralis minor muscle. The first part begins at the outer border of the first rib and extends to the medial border of the pectoralis minor muscle. The second part of the axillary artery lies deep to the pectoralis minor muscle. The third part lies between the lateral border of the pectoralis minor muscle and the inferior border of the teres major muscle. The axillary artery is usually described as giving 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, and anterior and posterior circumflex humeral arteries. The thoracoacromial trunk pierces the clavipectoral fascia and immediately divides into clavicular, pectoral, acromial and deltoid terminal branches[6].

According to Hollinshead (1958), the blood supply to the limb bud is at first in the form of a capillary plexus derived from the several intersegmental arteries to which it is adjacent. Normally, the seventh intersegmental artery soon becomes the main stem, and as the aortic arches are resolved into their definitive condition a part of the aortic arch system plus the seventh segmental artery becomes the subclavian-axillary stem on the right side, and the seventh segmental artery alone becomes the subclavian-axillary stem on the left side[2].

CASE REPORT

During routine dissection of undergraduate teaching in the Department of Anatomy at Maulana Azad Medical College on 40-year old formalin fixed female cadaver, a bilateral variation in the branching pattern of axillary artery was noticed. On the right side, a common trunk took origin from the second part of the axillary artery which divided into lateral thoracic and subscapular artery (Figure 1). Subscapular artery in turn branched into circumflex scapular and thoracodorsal artery. Posterior circumflex humeral artery took origin from subscapular artery and coursed around the neck of humerus along with axillary nerve. The origin and course of superior thoracic and thoracoacromial artery was normal. The third part of the axillary artery had only one branch instead of three branches and it gave origin to anterior circumflex humeral only. Thus, the right axillary artery gave origin to four branches instead of the normal pattern of six branches.

In the left axilla, a common trunk took origin from the third part of the axillary artery which in turn gave origin to lateral thoracic and subscapular artery (Figure 2). Subscapular artery had a short stem and immediately divided into circumflex scapular and thoracodorsal artery. Rest of the branches of the left axillary artery had normal origin and course.

DISCUSSION

Earlier studies by many observers showed that variations in the branching pattern of the axillary artery are very common. In the present case report, the number of branches from the axillary artery varied on both sides. The right axillary artery gave origin to four branches and the left axillary artery to five branches instead of the normal pattern of six branches. According to Huelke (1958), each branch, however, does not always arise directly from the axillary artery, and thus the total number of the direct axillary branches varies. Six factors may change the number of axillary branches which may be due to the complete absence of one or more of the branches; branches arising from another axillary branch; branches arising by a common stem;

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branches arising from a source other than the axillary artery or one of its branches; shortening of the axillary artery by dividing, at the lateral border of the pectoralis minor tendon into brachial and deep brachial arteries; or a combination of two or more of the above factors[7].

A common trunk for lateral thoracic with subscapular from second part of axillary artery was reported in 1.2% by De-Garis and Swartley[8], in 25% by Huelke[7], in 6% by Patnaik et al[9] & as a case by Mehrdad **and Sadeghi**[10]. Patnaik et al has observed that in 4%, common trunk for lateral thoracic, subscapular & posterior circumflex arteries arose from the second part[9]. Saeed et al reported a common trunk arising from the second part branching into lateral thoracic, circumflex humeral, subscapular and thoracodorsal arteries. In the current case, thoracodorsal artery took origin from subscapular artery[11]. Bhat et al observed a common trunk from the second part from which arose thoracoacromial, lateral thoracic, subscapular & posterior circumflex arteries but in the present case thoracoacromial artery arose directly from second part[12]. Variant trunk from the second part observed in present case was similar to the finding of Chitra and Anandhi[13] and Jain et al[14].

According to Patnaik et al[9], direct origin of subscapular from third part of axillary artery is important clinically as the axillary artery is usually ligated in third part either above or below subscapular artery, between it and origin of posterior circumflex humeral artery. The latter is point of election as then the collateral circulation develops between thoracoacromial and subscapular above & posterior circumflex humeral below.

Sarkar et al observed a common trunk from third part which gave origin to a muscular branch, lateral thoracic, subscapular and posterior circumflex arteries[15]. The present case also reported a similar variation but posterior circumflex artery arose directly from the third part.

Rodriguez-Niedenführ et al observed that formation of the arterial system in the upper limb takes place as a dual process. The initial capillary plexus enters the limb bud during its outgrowth. This plexus develops at the same rate as the limb by a proximal to distal differentiation (in the forearm with a posterior-anterior polarity) and the upper limb arteries are formed due to the maintenance, enlargement and differentiation of certain capillary vessels, and the regression of others. This differentiation process parallels the development of the skeletal system chronologically[16].

According to Arey, the anomalous blood vessels may be due to the choice of unusual paths in the primitive vascular plexuses, the persistence of vessels which are normally obliterated, the disappearance of vessels which are normally retained, incomplete development & fusions and absorption of the parts which are usually distinct[17].

Fibroblast growth factor, FGF2, induces blood island development from competent mesoderm cells that form hemangioblasts. Hemangioblasts are directed to form blood cells and vessels by vascular endothelial growth factor (VEGF), which is secreted by surrounding mesoderm cells. Maturation and modeling of the vasculature are regulated by platelet derived growth factor (PDGF) and transforming growth factor (TGF-β)[18]. Any disturbance in this process may result in variant arterial pattern.

The subclavian and axillary arteries are gaining increasing interest in the cardiac surgery community as they have been successfully used as cannulation sites for cardiopulmonary bypass in thoracic aortic procedures. They have also been taken for insertion of intra aortic balloon pumps and most recently they are under discussion for use as an inflow vessel in coronary artery surgery[19]. The increasing use of invasive diagnostic and interventional procedures in cardiovascular diseases makes it important that the type and frequency of vascular variations should be understood[20].

CONCLUSION

Awareness of details and topographic anatomy of variations of the axillary artery may serve as a useful guide and may help to prevent diagnostic errors, influence surgical tactics and interventional procedures and avoid complications during the surgeries of the axilla. Accurate information regarding such variations is significant during vascular, reconstructive and orthopedic surgeries and during evaluation of angiographic images.

CONFLICT OF INTEREST: Nil

Figure 1. Right axilla showing common trunk (CT) for lateral thoracic (LT), subscapular (SA) and posterior circumflex humeral artery (PCA) from second part of axillary artery (AA). (CS- circumflex scapular artery, TD- thoracodorsal artery, PM- pectoralis minor, AN- axillary nerve, MN- median nerve)

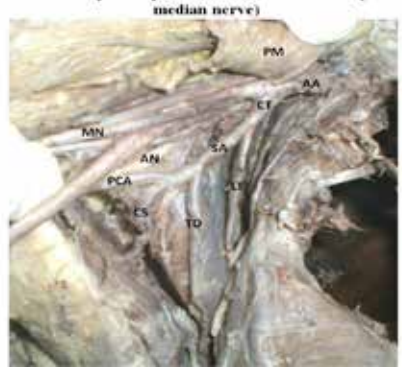
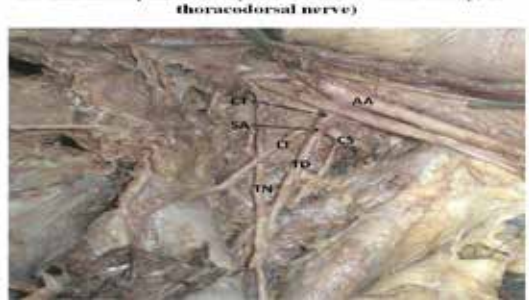


Figure 2. Left axilla showing common trunk (CT) for lateral thoracic (LT) and subscapular artery (SA) from third part of axillary artery (AA). (CS- circumflex scapular artery, TD- thoracodorsal artery, TN- thoracodorsal nerve)



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