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RESEARCH ARTICLE

Unique branching pattern of the axillary artey- case report of a unilateral variation.

Dr. Keerti Bhardwaj[1], Dr. S.K. Kataria[2], Dr. Leena Raichandani[3], Dr. Kushal Kataria[4] , Surbhi Raichandani[5]

1. PG student, Department of Anatomy, Dr. S.N. Medical College, Jodhpur.
2. Professor and Head of Department, Department of Anatomy, Dr. S.N. Medical College, JodhpurProfessor,
3. Department of Anatomy, Dr. S.N. Medical College, Jodhpur
4. Consultant anaesthetist, Jodhpur
5. 7th sem M.B.B.S Student, Dr. S.N. Medical College, Jodhpur

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Corresponding Author

KEERTI BHARDWAJ

Abstract

Axillary artery is derived from the axial artery of the upper limb. The branching of axillary artery is studied under three parts, first second and the third part. Each part gives rise to different branches. The pattern of this branching is a subject of study by many anatomists who have shown variations in the branching pattern. Twenty upper limbs from ten cadavers were studied in the department of anatomy of Dr. S.N. Medical College in Jodhpur. Cadavers were dissected using classic dissection techniques and the variations were observed and recorded. It was observed that the second part gave rise to three main branches instead of the usual two branches.

INTRODUCTION

Axillary artery is the main artery of the upper limb. It is a continuation of the subclavian artery. It extends from the subclavian artery at the outer border of the first rib through the apex and lateral part of the axilla to become the brachial artery at the lower border of the teres major. For the purpose of better understanding and description it is divided into three parts based on the position of the pectoralis minor muscle. (Jnanesh S Rayapati 2010)[1] First part lies superior and medial to the pectoralis minor and it gives one branch, superior thoracic artery. Second part lies posterior or deep to the muscle and gives two branches, first thoracoacromial artery arises at the medial or upper border of the pectoralis minor and at the lower or lateral border it gives second branch lateral thoracic artery. Third part gives three branches namely subscapular artery, anterior circumflex humeral and posterior circumflex humeral artery. Variations in the branching pattern of axillary artery are very commonly encountered during dissections. These variations can be unilateral or bilateral. There is a significance of these variations from clinical point of view to provide accurate diagnosis and to avoid any sort of iatrogenic injuries while performing various major or minor surgical or repair procedures in the region of axilla or arm. The unilateral variation so observed is thus important and relevant clinically and for better understanding of embryological basis of formation of blood vessels. (Standring S 2008)[7]

MATERIALS AND METHODS

Material for the study comprised of 20 upperlimbs in 10 embalmed cadavers, 6 males and 4 females. Dissections of the upper limbs were performed in the department of anatomy of Dr. S.N.Medical College, Jodhpur. Axillary artery and its branches in these cadavers were exposed employing classic incisions and dissection techniques. Also the

dissections were carried out retaining the continuity with the trunk. Care was taken not to damage the axillary artery and its branches and where possible the adjoining structures. Variations were observed and recorded.

CASE REPORT:

A unilateral variation in branching pattern of axillary artery was observed in right upperlimb of a 57 years old male cadaver. It was observed that the second part gave rise to three main branches instead of the usual two branches, thoracoacromial at the level of upper border of pectoralis minor, lateral thoracic a little above from this level instead, normal origin being the lower border of pectoralis minor. Subscapular artery is seen arising from almost the same level of thoracoacromial instead of arising from the third part. Thoracoacromial took its usual route and gave its terminal branches. One minor branch supplying the pectoral muscles also was seen arising directly from the second part, which is normally a division of the thoracoacromial artery. Subscapular artery after travelling for a short distance gave a large branch, circumflex scapular, which went into the triangular intermuscular space and another branch the thoracodorsal. From the third part instead of three branches only two were seen to arise, the smaller anterior circumflex humeral and larger posterior circumflex humeral artery. All the three parts had normal relations with cords of brachial plexus and their branches too.

DICUSSION:

Time and again various anatomists have studied the variations in the axial artery and have reported varying patterns of branching both unilateral and bilateral. Sometimes the axillary artery divides into the radial and ulnar arteries, and occasionally it gives origin to the volar interosseous artery of the forearm. (Williams et al, 1989)[9]

Some authors have illustrated major variations of the axillary artery as (Saeed et al 2002[6], Bergman et al 2006[4]): 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 artery. 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. (Patnaik et al 2000)[3]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 artery.

A common trunk from second part of the axillary artery has been reported which gave rise to muscular branches to pectoralis major and deltoid,lateral thoracic artery subscapular artery and thoracoacromial artery. (Kumar.Bhat in 2008)[2]

In yet another variation the third part of the axillary artery divided into superficial brachial and deep brachial arteries (VijayaBhaskar in 2006).[8] In this instance 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.

Embryological basis of such variation in branching pattern of axillary artery is very important. This can be explained from the fact that the vascular development takes place from mesoderm under two mechanisms, vasculogenesis and the angiogenesis. Vasculogenesis gives rise to vessels by coalescence of angioblasts and branches arise from the so formed main vessels by the process of Angiogenesis. In the whole process the VEGF (vascular endothelial growth factor) and FGF (fibroblast growth factor) and other growth factors take part.VEGF regulates both vasculogenesis and the angiogenesis. During angiogenesis VEGF stimulates proliferation of endothelial cells at points where new vessels will sprout from existing ones. Platelet derived growth factor (PDGF) and transforming growth factor β (TGF-β) guides the final modeling and stabilization of the so developed vascular system.the appearance of such variations in the branching pattern of axillary artery can be due to deviation in the action of VEGF at the points other than the usual. (Sadler TW 2006)[5]

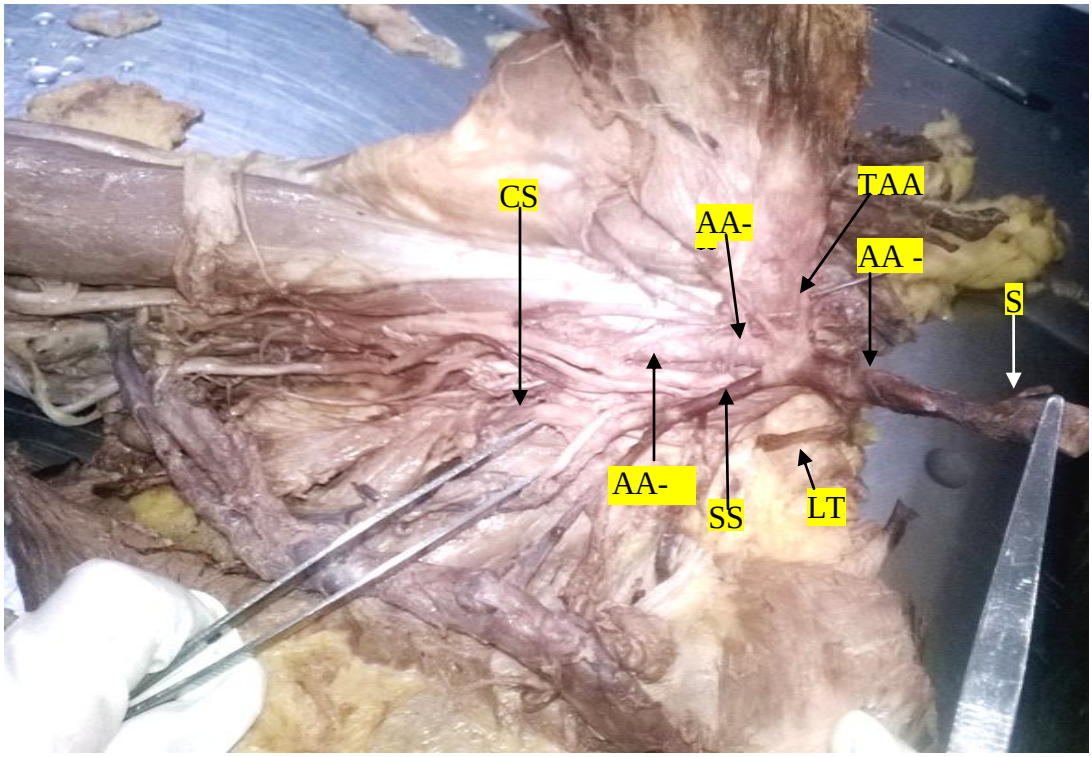

FIG-1:- unilateral variation in branching pattern of axillary artery(AA) on right side. Branches from First part- supreme thoracic(ST) artery and lateral thoracic (LT) artery arising from first part(AA-I) instead of second part. Second part of axillary artery (AA-II) giving rise to- thoracoacromian artery(TAA) and subscapular artery(SSA) arising from second part instead of third part of axillary artery(AA-III).

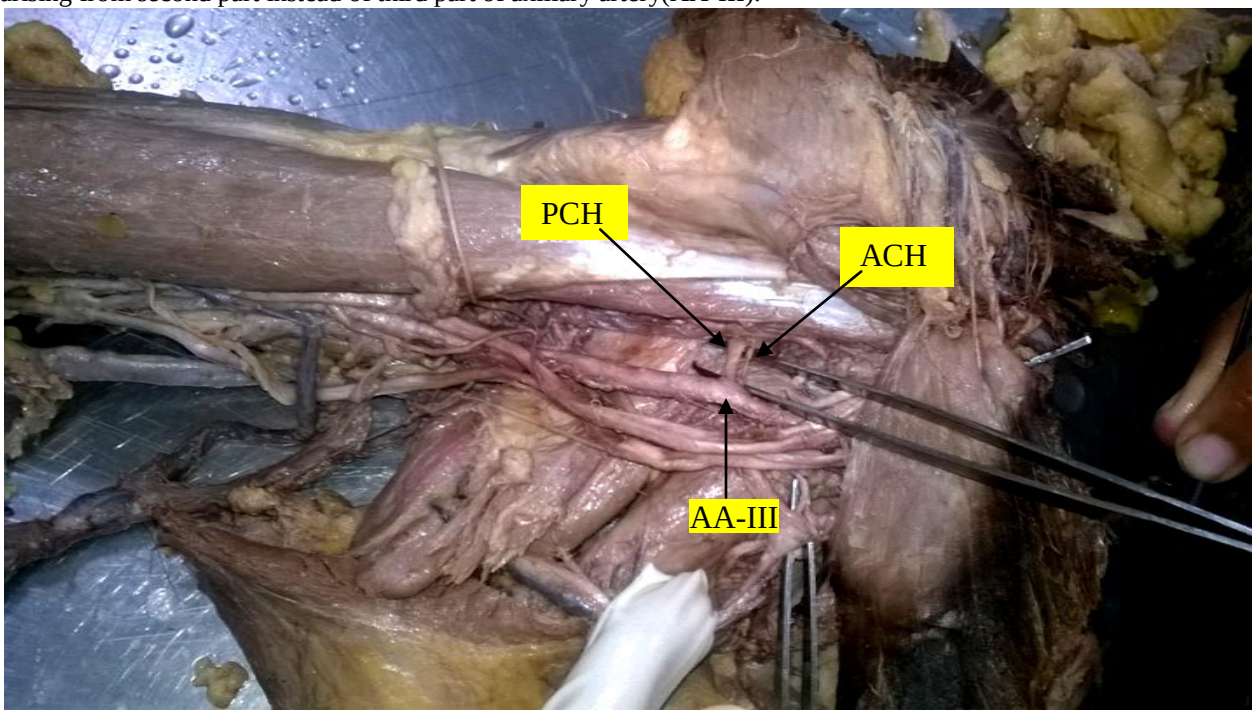

Figure-2:- Showing Third part of axillary artery giving rise to only two branches instead of three i.e anterior circumflex humeral(ACH) and posterior circumflex humeral(PCH).

CONCLUSION:

The thorough knowledge of the anatomical variations of the branching pattern is very essential in:-.

- Management of the fractures related to surgical neck of humerus and also in cases of shoulder dislocations.
- During minor or major surgical procedures for example while removal of axillary lymph nodes because of some pathological condition or during draining the abscess of axillary region or during serratus anterior flap surgery..
- It is important to know about the variations during vascular surgeries related to axillary artery like cannulation etc or while dealing with arteriovenous fistulae, aneurysms etc.
- While giving anesthesia, relation of axillary artery with the brachial plexus has to be given great importance to avoid any iatrogenic injuries.
- In aortic surgeries while giving shunt between axillary and subclavian artery in case of subclavian artery blockage.

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