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Original Article

A Cadaveric Study of Branching Pattern of the Axillary Artery

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ABSTRACT

Aims and Objective: Aims and objective of present study to describe the variation in branching pattern of axillary artery. **Material and Methods:** Present study conducted on 25 cadavers (40–75 year old) in SBKS MI & RC, Sumandeep Vidyapeeth University, Piparia, Vadodara, Gujarat. **Results:** Results of present study shows that out of 50 cases, in 36 (68%) cases having classic pattern of branching and 14 (28%) cases having variation in branching pattern of axillary artery. Second part of axillary artery shows 12% and third part of axillary artery shows 16% variation. Present study also shows in 4 (8%) cases variations in relation with the axillary vein. **Conclusion:** Awareness about details and topographic anatomy of variations of the axillary artery may serve as a useful guide for both radiologist and vascular surgeons. It may help to prevent diagnostic errors, interventional procedures and avoid complications during any surgery of the axillary region.

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1. Introduction

Axillary artery is the direct continuation of the subclavian artery at the outer border of the first rib. The course of the axillary artery is anatomically divided into three parts by the pectoralis minor muscle. The first part begins at the lateral border of the first rib and extends to the superomedial border of the pectoralis minor muscle. The first part is enclosed within the axillary sheath along with the axillary vein and brachial plexus. The second part lies deep to the pectoralis minor muscle and the third part lies between the inferolateral border of the pectoralis minor and the inferior border of the teres major muscle [1].

The axillary artery is usually 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, anterior and posterior circumflex humeral artery [2].

There is extensive collateral circulation associated with the branches of subclavian and axillary arteries particularly around scapula so that the sound knowledge of neurovascular variation is important for surgeons who remove the axillary lymph nodes, to anesthesiologist and orthopedic surgeons considering the frequency of procedures done in this region. It is very common to find the variations in the branching pattern. Sometimes many of the branches may originate from a common stem or arise separately [3].

2. Material And Methods

The present study undertaken on 25 cadavers (40–75 year old) in SBKS MI & RC, Sumandeep Vidyapeeth University, Piparia, Vadodara, Gujarat. The cadavers were donated by relatives with consent letter and certificate of cause of death by practitioner. None of them had any pathological lesions, traumatic lesions or surgical procedures in the neck and the axillary region.

The axillary region was dissected and exposed according to the methods described by Romanes in Cunningham's Manual of Practical Anatomy [4]. The entire axillary artery was cleaned and the pattern of branching was seen and reported here.

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3.Results

Fifty specimen of superior extremity were dissected carefully and observation and results were described under following heading:

1) Variations in first part of axillary artery: Any type of variation in branching pattern of first part of axillary artery not found in present study (Table-1).

Table 1. Variation in branching pattern of axillary artery

Variation Present in	No. of cases	%
Origin	—	—
First Part	—	—
Second Part	6	12
Third Part	8	16
Accompanies veins	4	8

1) Variations in second part of axillary artery: Present study shows that the second part of axillary artery having 12% variation (Table-1). They are as follow:

a) In 6% cases the second part of axillary artery show two to three extra branches. The extra branches coming from second part of axillary artery called as Alar arteries [1] (Table-2).

b) In 4% cases subscapular artery arises from the second part of axillary artery. It is also reported that in these cases the circumflex artery does not arise from the subscapular artery (Table-2).

c) Present study shows an unreported variation in 2% cases that is the small diameter artery arises from the second part of axillary artery opposite the lateral thoracic artery near the lower border of pectoralis minor. It runs laterally and downwards and superficial in arm, superficial to the bicipital apponeurosis in cubital fossa, anterior to the flexor digitorum superficialis in forearm, deep to the flexor retinacula and take part in the formation of superficial palmar arch. Name of this artery is superficial artery of second part of axillary artery given by present study. Here we can say this artery having much clinical importance; it can be cut easily at the time of minor intravenous injection or any external injury and may be a cause of large bleeding (Table-2).

2) Variations in the third part of axillary artery: Present study shows that the second part of axillary artery having 8% variations. They are as follow:

a) In 4% cases the circumflex scapular artery directly arises from the third part of axillary artery (Table-2).

b) In 2% cases the anterior circumflex is two in number (Table-2).

c) In 2% cases posterior circumflex humeral artery a large trunk, arises along subscapular artery. It passes between the teres major and minor accompanied by axillary nerve then it having normal course and relation (Table-2).

3) Other variations: In 4% cases the axillary artery accompanied by two axillary veins one on each side. These veins unite each other in front of the first part of axillary artery. These veins may be cause of large bleeding in any type of surgery in axillary region (Table-1).

Table 2. Variation presents in branching pattern of the second part of axillary artery

Name of Abnormal origin of braches	No. of cases	%
Alar Branches	3	6
Subscapular artery	2	4
Superficial branch	1	2
Total	6	12

Table 3. Variation presents in branching pattern of the third part of axillary artery

Name of Abnormal origin of braches	No. of cases	%
Subscapular artery	2	4
Circumflex scapular artery	2	4
Posterior circumflex humeral artery	2	4
Anterior circumflex humeral artery	2	4
Total	8	16



Figure 1: Abnormal branching pattern of 2nd part of axillary artery
AA: Axillary artery, AB: Alar branches, LTA: lateral thoracic artery

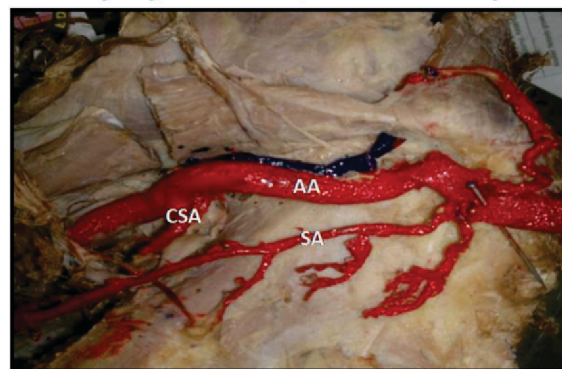


Figure 2: Abnormal origin of sub scapular artery.

AA: Axillary artery, CSA: Circumflex Scapular artery, SA: Subscapular artery



Figure 3: Superficial branch of 2nd part of axillary artery

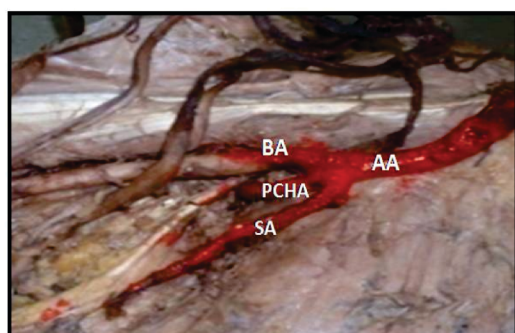


Figure 4: Abnormal branching pattern of 3rd part of axillary artery

AA : Axillary Artery BA : Brachial artery, PCHA: Posterior circumflex humeral artery, SA: subscapular artery

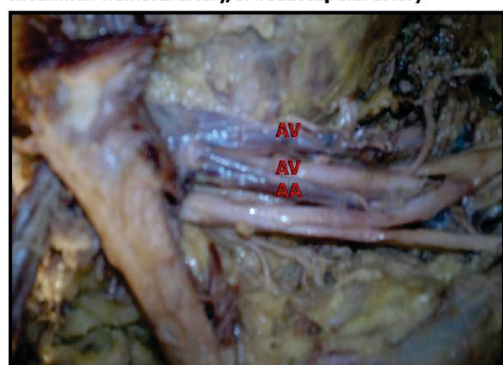


Figure 5: Axillary artery accompanied by two axillary veins.

AA : Axillary artery , AV : Axillary vein

4. Discussion

Anomalies in axillary artery with regard to origin, course and branching patterns are not frequent. During embryogenesis the lateral branch of seventh cervical inter segmental artery becomes enlarged to form the axial artery of upper limb which on further development becomes axillary, brachial, its bud gives rise to radial and ulnar arteries [5-6].

The arterial anomalies in the upper limb are due to defects in embryonic development of the vascular plexus in the upper limb buds. This may be due to arrest at any stage of development of the vascular plexus showing regression, retention or reappearance and may lead to variations in the arterial origins and courses of the major upper limb vessels [7].

The axillary artery is usually described as giving off six branches although the number varies because two or more arteries often arise together instead of separately or two branches of an artery arise separately instead of from the usual common trunk. Thus instead of six there may be 5-11 branches.

A rare but striking anomaly of the axillary artery is for it to divide into two branches that proceed down the arm. When this occurs, usually one of the arterial stems in the arm runs more superficially than the other, and they are therefore sometimes distinguished as brachial artery and superficial brachial artery. This apparent doubling of the brachial artery more commonly occurs in the arm than in the axilla this is similar (not close) to superficial branch of 2nd part of axillary artery found in present study [8]. In 6% cases the 2nd part of axillary artery gives extra branches they are reported as Alar branches by present study. Case with this kind of variation should be examine or operated carefully during surgeries involved in breast augmentation and mastectomy The axillary artery bifurcated into almost equal size trunks. The superficial among the two continued as the brachial artery. The abnormal deep trunk bifurcated into a common circumflex humeral- subscapular trunk and a profunda brachii artery. The common circumflex humeral subscapular trunk further divided to give anterior and posterior circumflex humeral arteries and subscapular artery [9]. In our study, we have found subscapular artery arising from 2nd parts of axillary artery in 4% cases.

In up to 30% of cases subscapular artery can arise from a common trunk with posterior circumflex humeral artery. Occasionally the subscapular, circumflex humeral and profunda brachii arteries arise in common, in which case branches of the brachial plexus surround this common vessel instead of axillary artery. The posterior circumflex humeral artery may arise from the profunda brachii artery and pass back below the teres major instead of passing through the quadrangular space [10]. Present study shows that in 4% cases posterior circumflex humeral artery is a large trunk arises with the subscapular artery. It seems like axillary artery divide into three terminal branches they are subscapular, posterior circumflex humeral and brachial artery.

The branches of the third part are subject to great variations. The two circumflex arteries may arise from a common trunk, usually alone or rarely together with profunda brachii and muscular branches. Very rarely 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 [11].

Unreported case of present study is in 8% cases the axillary artery accompanied by two axillary vein on each side of artery. They fused with each other in front of first part of axillary artery.

Anomalies in the origin and course of principal arteries are having practical importance for the vascular radiologist. Chronic dislocation of the shoulder joint the incision is transverse and may injure the branches of axillary artery. So during surgery the abnormal branch may be definite cause of bleeding if its presence is not kept in mind [12-13].

Sound knowledge of axillary artery variation is important for surgeons, since except for the popliteal, the axillary artery is more frequently lacerated by violence than any other surgery. It has been ruptured in attempt to reduce old dislocations, especially when the artery is adherent to the articular capsule [14].

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6. References

- [1] Standring S editor. Gray's Anatomy: The Anatomical Basis of Clinical Practice. 40th ed. 2008. Churchill-Livingstone: Elsevier. ISBN 978-0-443-06684-89.
- [2] Snell R. Clinical Anatomy for medical students. 7th ed. 2004;475-477.
- [3] Hollinshed WH. Anatomy for surgeons in general surgery of upper limb. The back and limbs. A Heber Harper Book, New York, 1958;290-300.
- [4] Romanes G J: Cunningham's Manual of Practical Anatomy. Vol 1 Upper Limb and Lower Limb 15th edi 2003;27-35.
- [5] Tan C B, Tan C K. An unusual course and relations of the human axillary artery. Singapore Med J 1994; 35: 263-264.
- [6] Jurjus AR, Correa-De-Aruaujo R, Bohn RC. Bilateral double axillary artery: embryological basis and clinical implications. Clin Anat 1999; 12:135-140.
- [7] Hamilton WJ, Mossman HW. Cardiovascular system. In: Human embryology. 4th ed. Baltimore: Williams and Wilkins, 1972; 271-290.
- [8] Hollinshead, W. H. & Rosse, C. Text Book of Anatomy. 4th Ed. Harper & Row, Philadelphia, 1985;187-189.
- [9] George, B. M.; Nayak, S. & Kumar, P. Clinically significant neurovascular variations in the axilla and the arm – a case report.. Boston; Little Brown Co. Neuroanatomy, .; 1992; 6(1):36-38,
- [10] Johnson, D. & Ellis, H. Pectoral girdle and upper limb. In: Standring, S. Ed. Gray's Anatomy 39th ed. Edinburgh, Elsevier, 2005;845.
- [11] Bergman, R. A.; Thomson, S. A.; Afifi, A. K. & Saadeh, F. A. Compendium of Anatomic Variation. In: Cardiovascular system. Baltimore, Urban and Schwarzenber, 1988;72-73.
- [12] Shoulder joint. In: Decker GAG, du plessis DJ. Lee Mc Gregor's Synopsis of Surgical Anatomy. 12th ed. Mumbai: K.M. Varghese Company, 1986;451.
- [13] Cervicobrachial region. In: Samuel L Turek's orthopaedics: Principles and their Applications: Vol 2. 4th ed. New Delhi: Jaypee brothers, 1989;913.
- [14] Williams, P. L.; Bennister, L. H.; Berry, M. M.; Collins, P.; Dyson, M.; Dussek, J. E. & Ferguson, M. W. J. Gray's Anatomy. In: Cardiovascular system. Gabella, G. Ed. 38th Ed. Edinburg, Churchill Livingstone, 1995;37- 38.