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Research Paper

Study of Branching Pattern of Axillary Artery – A Cadaveric Study

Medical Science

KEYWORDS : Topographic anatomy, Axilla

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ABSTRACT

Aim of the study: To study the branching pattern of Axillary artery and to detect the abnormalities in the branching pattern of Axillary artery.

Materials and Method: The study was conducted in Anatomy Department at B. J. Medical College, Civil Hospital, Ahmedabad. Hundred axillae were dissected (50 cadavers bilaterally) and branches of Axillary artery were observed from their point of origin from Axillary artery and traced to their termination.

Result: Results of present study showed that out of 100 upper limbs 75 had normal branching pattern and 25 had variations in branching pattern of Axillary artery.

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 and to avoid complications during any surgery of the axillary region.

Introduction:

The Axillary artery is continuation of the subclavian artery. It begins at the outer border of the first rib, and ends at the inferior border of teres major where it becomes the brachial artery.

Its direction varies with the position of the limb. It is almost straight when the arm is raised at right angles, concave upwards when the arm is elevated above and convex upwards and laterally when the arm is by the side [1].

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 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. The third part lies between the inferolateral border of the pectoralis minor and the inferior border of the teres major muscle [1].

The branches of the Axillary artery are [2],

1st part: - Superior thoracic artery (STA)

2nd part: - Thoraco-acromial artery (TAA)

- Lateral thoracic artery (LTA)

3rd part: - Subscapular artery (SSA)

- Anterior circumflex humeral artery (ACHA)

- Posterior circumflex humeral artery (PCHA)

It is very common to find the variations in the branching pattern of axillary artery. Sometimes many of the branches may originate from a common stem or arise separately [3]. So the number of branches of axillary artery varies.

There is extensive collateral circulation associated with the branches of subclavian and Axillary artery particularly around scapula. So knowledge of neurovascular variation is important to surgeons who remove the Axillary lymph nodes, to anaesthesiologist who give Axillary anaesthesia and to orthopaedic surgeons considering the frequency of procedures done in this region.

Aims of study:

- To study branching pattern of axillary artery.
- To describe the variation in branching pattern of axillary artery.
- To correlate the knowledge of branching pattern of axillary artery with its clinical aspects.

Materials and Methods:

The present study was undertaken on 50 cadavers in Anatomy Department at B. J. Medical College, Civil Hospital, Ahmedabad-16. The cadavers were donated by relatives with consent letter and certificate of cause of death by practioner. None of them had any pathological lesions, traumatic lesions or surgical procedures in the neck and the axillary region.

The Axillary regions on both the side were dissected and exposed according to the methods described by Romanes in Cunningham's Manual of Practical Anatomy [4]. The entire axillary artery was cleaned. The branches of Axillary artery were observed from their point of origin from Axillary artery and traced to their termination and reported here.

Results:

Results of present study showed that out of 100 upper limbs 75 had normal branching pattern and 25 had variations in branching pattern of Axillary artery.

Most common variation found in present study was common trunk arising either from 2nd or 3rd part of axillary artery.

1) Variations in 1st part of axillary artery: Present study shows that the 1st part of axillary artery having 3% variation. They are as follow:
   a. Alar thoracic branch was arising from 1st part in 1 limb.
   b. LTA was arising from 1st part in 2 limbs.
2) Variations in 2nd part of axillary artery: Present study shows that the second part of axillary artery having 15% variation. They are as follow:
   a. LTA was arising from 1st part in 2 limbs.
   b. TAA & LTA were arising as common trunk from 2nd part in 6 limbs.
   c. Common trunk arising for LTA, PCHA & SSA from 2nd part in 2 limbs.
   d. All branches of TAA were directly arising from 2nd part in 2 limbs.
3) Variations in 3rd part of axillary artery: Present study shows that the second part of axillary artery having 20% variation. They are as follow:
   a. PCHA & SSA were arising from 2nd part in 2 limbs.
   b. Common trunk arising for SSA & ACHA from third part in 3 limbs.
   c. Common trunk arising for SSA & PCHA from third part in 8

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limbs.

d. Common trunk arising for ACHA & PCHA from third part in 5 limbs.
e. Common trunk arising for SSA, ACHA & PCHA from third part in 2 limbs

Table (1): Variations in branching pattern in parts of Axillary artery are as follow:

Part of Axillary Artery	No. of cases	%
First Part	3	3%
Second Part	12	12%
Third Part	20	20%

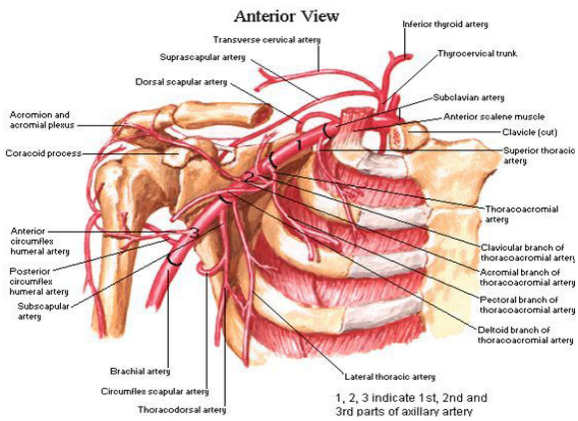

Figure 1: Normal branching pattern.

Table (2): Variations in origin of branches of Axillary artery are as follow:

Branch of Axillary Artery	Normal Origin	Abnormal Origin	Percentage of Abnormality
Superior thoracic artery	100	0	0%
Thoraco-acromial artery	92	8	8%
Lateral thoracic artery	90	10	10%
Subscapular artery	85	15	15%
Anterior circumflex humeral artery	90	10	10%
Posterior circumflex humeral artery	83	17	17%

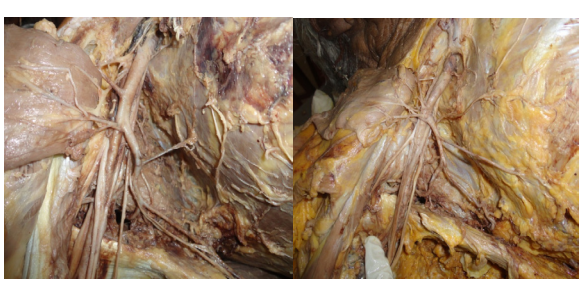

Figure 2 & 3: Showing abnormal branching pattern of Axillary artery.

Discussion:

Anomalies in axillary artery with regard to origin, course and branching patterns are 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 case reported by Venieratos & Lolis (2001) shows common subscapular trunk gave origin to circumflex scapular, thoracoacromial , anterior and posterior circumflex humeral, profunda brachii and ulnar collateral arteries [8].

The variation reported by Vijaya Bhaskar in 2006 the third part of the axillary artery divided into superficial brachial and deep brachial arteries[9].

Magden in 2007 *observed* "abnormal" branching pattern of the axillary artery and unusual branch to the serratus anterior muscle, which originated directly from the first part of the axillary artery as the first branch. The lateral thoracic and thoraco-acromial arteries arose together from the third part of the axillary artery as "a lateral thoracicthoracodorsal" common trunk [10].

A common trunk from second part of the axillary artery was reported by Kumar Bhat in 2008, which gave rise to muscular branches to pectoralis major and deltoid, lateral thoracic artery, subscapular artery and thoracoacromial artery [11].

Study by Samta gaur in jan 2012 reavealed that in 30% of cases subscapular artery was arising from a common trunk with posterior circumflex humeral artery [12].

We reported that 3rd part of axillary artery showed maximum variation (20%) and PCHA branch showed maximum variation in origin (17%).

Conclusion:

Anomalies in the origin and course of principal arteries are having practical importance for the vascular radiologists and surgeons. In axillary approach to chronic dislocation of the shoulder joint the incision is transverse and it may injure the deep axillary artery [13].

Brachial plexus injury is a common condition which requires exploration and repair. During surgery the abnormal branch may be a definite cause of concern if its presence is not kept in mind [14]. Therefore both the normal and abnormal anatomy of the axillary region should be well known for accurate diagnostic interpretation and therapeutic intervention

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