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Original Research Article

# ANATOMICAL STUDY OF AXILLARY ARTERY VARIATIONS

**Deepak Arvind Patil *[1], Asmita Sachin Jadhav [2], Anupama Srinivas Katti [3].**

*[1] Assistant Professor, Department Of Anatomy, Government Medical College, Miraj, Sangli, Maharashtra, India.

[2] Assistant Professor, Department Of Anatomy, Government Medical College, Miraj, Sangli, Maharashtra, India.

[3] Associate Professor, Department Of Anatomy, Government Medical College, Miraj, Sangli, Maharashtra, India.

## ABSTRACT

**Background :** The axillary artery is a direct continuation of the subclavian artery. The axillary artery is usually described as giving off six branches. Variation in the branching pattern of axillary artery is not uncommon. The knowledge of these variations is of anatomical, radiological and surgical interest to explain unexpected clinical signs and symptoms.

**Materials and Methods:** Bilateral dissection of axilla was conducted on 10 embalmed cadavers during routine dissection and the branching patterns of the axillary artery was studied.

**Observations and Results:** Unilateral variations were observed in three cadavers. In the first case, we observed a unique variation of a common trunk coming from the first part of the axillary artery which gave origin to subscapular, anterior circumflex humeral, posterior circumflex humeral and profunda brachii arteries . In the remaining two cases, we observed a common subscapular- thoracoacromial trunk from the second part of axillary artery.

**Conclusion:** The detailed knowledge about anatomy of normal as well as variant axillary artery is very helpful for the surgeons and radiologists performing interventional or diagnostic procedures in cardiovascular diseases.

**KEY WORDS:** Axillary Artery, Common Trunk, Variation.

**Address for Correspondence:** Dr. Deepak Arvind Patil, Assistant Professor, Department Of Anatomy, Government Medical College, Miraj, Pandharpur Road, Miraj Dist. – Sangli, Maharashtra, India.
**E-Mail:** deepak_bjmc2004@rediffmail.com

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## INTRODUCTION

The axillary artery, a continuation of the subclavian artery, begins at the outer border of the first rib and ends normally at the inferior border of teres major muscle where onwards it continues as the brachial artery. Pectoralis minor muscle crosses it and divides it into three parts which are proximal, posterior and distal to the muscle. Conventionally, the proximal part (first part) gives superior thoracic artery, the posterior part (second part) gives thoraco-acromial and lateral thoracic arteries and distal part (third part) gives subscapular artery, anterior and posterior circumflex humeral arteries [1].

It is not uncommon to find variations in the branching pattern of axillary artery. Many of its

branches may arise by a common trunk or a branch of the named artery may arise separately [2]. There is an extensive collateral circulation associated with the branches of subclavian and axillary arteries particularly around the scapula. This clearly becomes of clinical significance during injury of the axillary artery.

We studied the total number of branches arising from three parts of axillary artery and variations in branching pattern which includes variation in the origin from anomalous location and origin along with other branches as a common trunk.

## MATERIALS AND METHODS

Bilateral dissection of axilla was conducted on 10 embalmed cadavers during routine dissection for undergraduate medical students. Exposure of the axillary artery and its branches were achieved following classical incisions and dissection procedures as provided by Cunningham's manual of practical anatomy [3].

Variations were observed, photographed and findings were noted.

## OBSERVATIONS AND RESULTS

Unilateral variations were observed in the branching pattern of axillary artery in three cadavers.

In the rest of the cadavers, axillary artery was normal in its course and distribution.

In the first case, we observed a unique variant of branching pattern of axillary artery which has not been reported till now in literature.

In this case (Fig. 1), we found a common trunk coming from the first part of axillary artery. This common trunk gave origin to subscapular, anterior and posterior circumflex humeral arteries (Branches of third part of axillary artery) and profunda brachi artery (Branch of brachial artery). Subscapular artery gave rise to circumflex scapular and thoracodorsal artery. Rest of the branches of first and second parts of axillary artery were normal in their course and distribution.

In the remaining two cases, we observed variation in the origin of subscapular artery from anomalous location i.e. from second part of axillary artery as common subscapular-thoracoacromial trunk.

**Fig. 1:** Showing common trunk arising from first part of axillary artery.

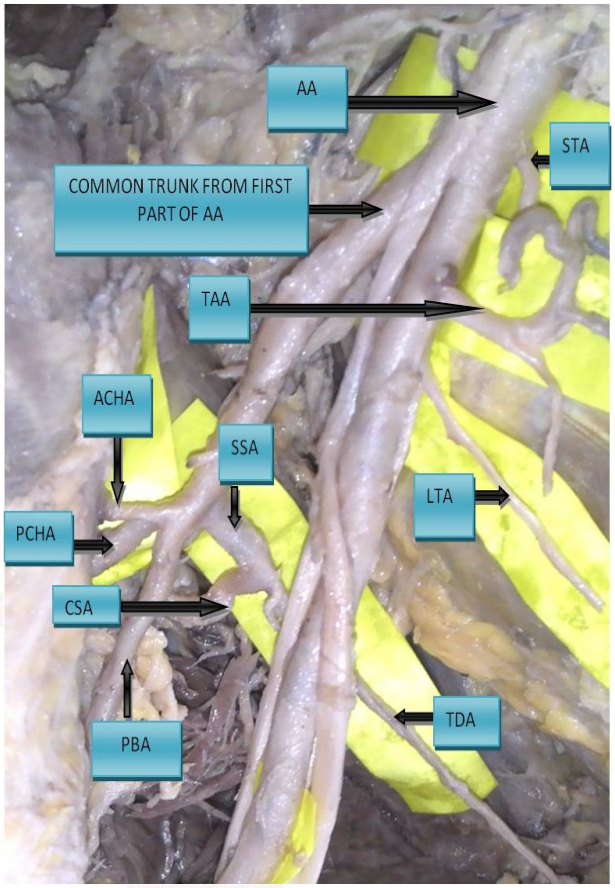
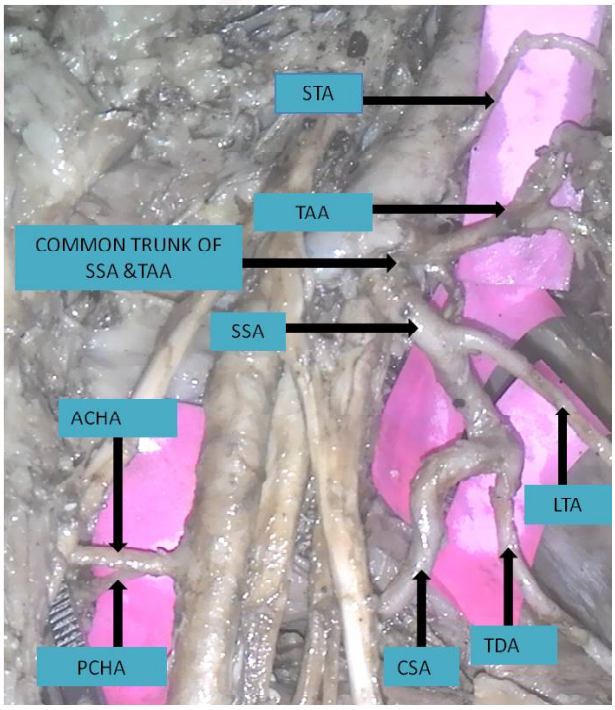



**Fig. 2:** Showing common trunk of subscapular and thoracoacromial artery.




Subscapular artery in this case (Fig. 2) gave variant lateral thoracic artery (which is normally a branch of second part of axillary artery) in addition to its normal branches circumflex scapular and thoracodorsal artery in one of these

two cadavers. Thoracoacromial artery gave origin to acromial,clavicular,pectoral and deltoid branches as usual. Rest of the branches of axillary artery were normal in their course and distribution.

No variation was noted in axillary artery in respective opposite limb.

## DISCUSSION

The branches of axillary artery show numerous variations in number, origin and distribution. Therefore only the relevant cases that have similarity with the present study are discussed here. According to DeGaris and Swartley [4], any branch of the axillary artery may arise proximal or distal to its usual site. Many of its branches may arise by a common trunk or a branch of the named artery may arise separately [2].

De Garis and Swartley[4] in their study found 5-11 branches arising directly from the axillary artery the most common number being 8. Heulke [5], in his study, found two to seven branches that arose from the axillary artery. Kanaka[6]et al. in their study observed 5-8 branches coming from axillary artery. In the present study, we found 5-8 branches coming from axillary artery.

Common trunk originating from second and third part of axillary artery has been reported in literature.

Saeed et al. [7] has reported a common subscapular-circumflex humeral trunk from the third part of axillary artery, which divided into subscapular, anterior circumflex humeral, and posterior circumflex humeral arteries in 3.8% of cases.

Vijaya et al. [8] reported a common trunk from the third part of the axillary artery which gave origin to anterior circumflex humeral, posterior circumflex humeral, subscapular, radial collateral, middle collateral, and superior ulnar collateral arteries with absent profunda brachial artery.

Bhat et al. [9] reported a case in which the common trunk gave rise to many branches such as the thoraco-acromial artery, the lateral thoracic artery, posterior circumflex humeral artery and sub scapular artery. The anterior circumflex humeral artery was found to arise from the third part.

Ramesh et al. [10] also reported a common trunk from the third part of the left axillary artery, which gave origin to subscapular, anterior circumflex humeral, posterior circumflex humeral, profunda brachial, and ulnar collateral arteries.

Srimathi [11] reported a common trunk from the second part of axillary artery gave origin to thoracoacromial, lateral thoracic, subscapular, and posterior circumflex humeral arteries.

In our study, we observed a common trunk coming from the first part of axillary artery. A common trunk coming from the first part has not been reported till now in literature. This common trunk gave origin to subscapular, anterior and posterior circumflex humeral arteries (Branches of third part of axillary artery) and profunda brachi artery (Branch of brachial artery). Subscapular artery gave circumflex scapular and thoracodorsal artery.

Variations in the origin of subscapular artery along with its branching pattern have been reported in previous studies.

According to Huelke's study[5], the subscapular artery arises from the first part of axillary artery in 0.6% cases, from the second part in 15.7% cases, and from the third part in 79.2% cases.

Samta et al. [12] reported subscapular artery arising from second part of axillary artery in 4% cases and in up to 30% of it arises from a common trunk with posterior circumflex humeral artery.

Venieratos D., Lolis E.D [13] described a variety of common subscapular trunks that gave origin to different branches like circumflex scapular, thoracodorsal, anterior and posterior circumflex humeral, profunda brachii and ulnar collateral arteries .

Kanaka S[6] et.al reported common trunk of subscapular and thoracoacromial artery from the second part of axillary artery in 15% of cases.

In the present study, we found a common trunk of subscapular and thoracoacromial artery arising from the second part of the axillary artery in two cadavers.

Subscapular artery gave origin to lateral thoracic artery in 14.6, 1, 23.4 and 26.4% in previous studies [5,14-16].

In the present study, we found origin of variant lateral thoracic artery from subscapular artery in one of the cadaver in addition to its normal branches circumflex scapular and thoracodorsal artery.

**Table 1:** Common trunk of subscapular and thoracoacromial artery arising from the second part of the axillary artery.

| Author's name | Percentage of variation |
|---|---|
| Kanaka S et.al [6] | 15% |
| Present study | 10% |

**Table 2 :** Incidence of origin of lateral thoracic artery from subscapular artery.

| Author's name | Percentage of variation |
|---|---|
| Huelke DF [5] | 14.6 |
| Pellegrini A [14] | 1 |
| Trotter M et al [15] | 23.4 |
| P'An MT [16] | 26.4 |
| **Present Study** | **5** |

Variations in branching pattern of axillary artery are due to defects in embryonic development of the vascular plexus of upper limb bud. This may be due to an arrest at any stage of development of vessels followed by regression, retention or reappearance, thus leading to variations in the arterial origin and course of major upper limb vessels. Such anomalous branching pattern may represent persist-ing branches of the capillary plexus of the developing limb buds and their unusual course may be a cause for concern to the vascular radiologists and surgeons, and may lead to complications in surgeries involving the axilla and pectoral regions [17-19].

## CONCLUSION

The knowledge of these variations is necessary for the surgeons considering the frequency of procedures performed in this region. The increasing use of invasive diagnostic and interventional procedures in cardiovascular diseases makes it important that the type and frequency of vascular variations are well documented and understood. Awareness about details and topographic anatomy of variations of the axillary artery may serve as a useful guide for both radiologists and vascular surgeons.

## ABBREVIATIONS

**AA -** AXILLARY ARTERY
**STA -** SUPERIOR THORACIC ARTERY
**TAA -** THORACO ACROMIAL ARTE
**LTA -** LATERAL THORACIC ARTERY
**SSA -** SUBSCAPULAR ARTERY
**CSA -** CIRCUMFLEX SCAPULAR ARTERY
**TDA -** THORACO DORSAL ARTERY
**PBA -** PROFUNDA BRACHII ARTERY
**ACHA -** ANTERIOR CIRCUMFLEX HUMERAL ARTERY
**PCHA -** POSTERIOR CIRCUMFLEX HUMERAL ARTERY

## Conflicts of Interests: None

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