

Original research article

## Topography and Variations in the Third Part of Axillary Artery of Human Cadavers

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### Abstract

Axillary Artery is a continuation of subclavian artery, extending from outer border of first rib to lower border of teres major muscle and it continues as brachial artery. The axillary artery usually gives off six branches, but the number arising independently from it is subject to vary. The aim of the study is to note for variations in origin and course of third part of axillary artery. In the present study, the variations were predominant on the right side and the variations noted in subscapular artery were 8%, circumflex scapular artery were 4%, thoracodorsal artery 4%. Absence of subscapular artery was noted in two specimens and so circumflex scapular artery and thoracodorsal artery originated separately from main part of third part of axillary artery in one specimen and in another specimen, thoracodorsal artery arose from circumflex scapular artery which in turn originated directly from third part of axillary artery. Subscapular artery had variation in its site of origin in two specimens. In one case, subscapular artery originated from posterior side and in the other case, at the level of circumflex humeral arteries.

**Keywords:** Axillary artery; Subscapular artery; Thoracodorsal artery; Circumflex scapular artery

### Introduction

Axillary artery is a continuation of subclavian artery. Axillary artery is divided into three parts by the pectoralis minor muscle. The branches arising from axillary artery are the following. The first part gives superior thoracic artery. The second part gives lateral thoracic and thoracoacromial artery. The third part gives subscapular artery, anterior circumflex humeral, posterior circumflex humeral artery<sup>1</sup>.

### MATERIALS & METHODS

Fifty embalmed upper limbs, which included both right and left limbs of 38 males and 12 females were dissected for the present study in Bangalore Medical College and Research Institute, during the period from 2017 and 2019.

### RESULTS

In the present study, the variations noted were as follows, the variations in subscapular artery were 8%, circumflex scapular artery was 4%, thoracodorsal artery was 4%. In the present study, results of the variations in arterial pattern of third part of axillary artery includes the following: Circumflex scapular artery and thoracodorsal artery arising separately from axillary artery due to absence of subscapular artery trunk. Origin of subscapular artery at level of circumflex humeral arteries. Origin of subscapular artery trunk with a longer course from posterior aspect

of axillary artery. Separate origin of circumflex scapular artery from third part of axillary artery which in-turn gave origin to thoracodorsal artery with absence of subscapular artery trunk.

**TABLE 1: Variations in the branches of third part of axillary artery.**

Number of Specimens	Sides Observed	Origin of	Right	Left	Total	Percentage
25	50	Subscapular artery	4	1	5	8%
		Circumflex scapular artery	1	1	2	4%
		Thoracodorsal artery	1	1	2	4%

**TABLE 2: Variations in subscapular arterial trunk.**

Number of Specimens	Sides Observed	Variations in Subscapular artery trunk	Right	Left	Total	Percentage
25	50	Absent	1	1	2	4%
		Origin from unusual site	2	-	2	4%

**TABLE 3: Variations in circumflex scapular artery.**

Number of Specimens	Sides Observed	Variations in Circumflex scapular artery	Right	Left	Total	Percentage
25	50	Direct origin	1	1	2	4%

**TABLE 4: Variations in thoracodorsal artery.**

Number of Specimens	Sides Observed	Variations in Thoracodorsal artery.	Right	Left	Total	Percentage
25	50	Direct origin	-	1	1	2%
		From Circumflex scapular artery	1	-	1	2%

**TABLE 5: Types of variations.**

No	Types of Variations	Name of the Artery	Percentage of Variations
1	Common trunk	Anterior circumflex humeral artery – Posterior circumflex humeral artery – Subscapular artery	2%
2	Absence	Subscapular artery	4%
3	Abnormal site of origin	Subscapular artery	2%
		Thoracodorsal artery	2%
4	Separate origin	Circumflex scapular artery	4%
		Thoracodorsal artery	2%

## DISCUSSION

VARIATION 1: Separate origin of circumflex scapular artery and thoracodorsal artery from third part of axillary artery.

Variation in origin and branching pattern of circumflex scapular artery and thoracodorsal artery from third part of axillary artery with absence of subscapular trunk.

As observed in figure 1, the variation noted was the absence of subscapular artery trunk from third part of axillary artery and presence of branches of subscapular artery (i.e.) circumflex scapular artery and thoracodorsal artery arose separately from the medial aspect of third part of axillary artery. Circumflex scapular artery and thoracodorsal artery had a parallel course with each other above the anomalous origin of posterior circumflex humeral artery. Circumflex scapular artery had variation in its origin and branching pattern. The artery originated separately from medial aspect of third part of axillary artery instead of branching from subscapular artery. The artery coursed in parallel with thoracodorsal artery below for a while. The artery had a straight course instead of circumflex course and pierced latissimus dorsi muscle to run along the lateral border of scapula without entering the triangular space.

The thoracodorsal artery also had a separate origin from the medial aspect of third part of axillary artery. The artery had a variation only in its origin while it coursed normally to supply latissimus dorsi muscle.

**Majumdar et al (2013)** noted the following variations: circumflex scapular artery arose from third part of axillary artery separately from other branches. Subscapular artery arose from second part of axillary artery divided into lateral thoracic artery and thoracodorsal artery<sup>2</sup>.

**Jae-Ho et al (2009)** explained that variation in the branching pattern of arteries are due to abnormal deviation from the normal growth pattern of the vascular network of the embryo at

the developmental stages resulting in various variations in the branching pattern of the arteries of upper extremities<sup>3</sup>.

**VARIATIONS 2: Variation in origin of circumflex scapular artery and thoracodorsal artery. Separate origin of circumflex scapular artery from third part of axillary artery which gave off thoracodorsal artery, with absence of subscapular artery trunk.**

As observed in figure 2, the subscapular artery, one of the largest branches of third part of axillary artery was absent in right upper limb while its branches circumflex scapular artery and thoracodorsal artery was noted. The origin of circumflex scapular artery was directly from third part of axillary artery and was wider in diameter. The circumflex scapular artery passed through triangular space and emerged out on the posterior aspect near the lateral border of scapula. Before passing through the triangular space, the circumflex scapular artery gave off thoracodorsal artery. The thoracodorsal artery which is the continuation of subscapular artery originated from circumflex scapular artery and its branching pattern was normal. Branches of third part of axillary artery had a normal relation with branches of brachial plexus. Usual variations observed in the origin of thoracodorsal artery was from circumflex scapular artery, lateral thoracic artery or both circumflex humeral arteries.

**Divya et al (2013)** observed similar variation in which thoracodorsal artery originated from circumflex scapular artery and there was absence of subscapular arterial trunk. With normal branching pattern of circumflex scapular artery and thoracodorsal artery<sup>4</sup>.

**Magden et al (2007)** observed abnormal branching of axillary artery. The subscapular artery was not present. The circumflex humeral artery originated directly from the third part of axillary artery. The thoracodorsal artery and lateral thoracic arteries arose together from third part of axillary artery as lateral thoracic – thoracodorsal common trunk<sup>5</sup>.

**VARIATION 3: Presence of unusual variant of alar thoracic artery from third part of axillary artery**

As observed in figure 3, the variation noted was the unusual origin of alar thoracic artery from third part of axillary artery. In the present study, on right side of female cadaver, a superficial artery was observed and on reaching the thoracic wall it dissipated into small branches in the superficial layer. The superficial artery which originated from the third part of axillary artery was considered as an unusual variant of alar thoracic artery. The alar thoracic artery is a very inconstant branch arising from second part of axillary artery. All the branches of third part of axillary artery arose from its usual origin and had a normal course in relation with branches of brachial plexus.

**Majumdar et al (2013)** observed a similar anomaly of unusual variant of alar thoracic artery from third part of axillary artery in the same cadaver noted another variation in which posterior circumflex humeral artery branched out from subscapular artery. In his study, they reported twice the present of alar thoracic artery from third part of axillary artery with incidence of 1.9% in male and 5.6% in female<sup>2</sup>.

**VARIATION 4: Origin of subscapular artery trunk from posterior aspect of third part of axillary artery.**

As observed in figure 4, variation was noted in the site of origin of subscapular artery. The subscapular artery trunk originated from the posterior aspect of third part of axillary artery, below the origin of circumflex humeral arteries. The subscapular artery had a long and wide trunk and after passing for a distance of about 4 cm it divided into circumflex scapular artery

and thoracodorsal artery. No variations in the branching pattern of circumflex scapular artery and thoracodorsal artery was noted. The anterior circumflex humeral artery and posterior circumflex humeral artery arose from its usual site. Branches of third part of axillary artery had normal relation with branches of brachial plexus.

#### **VARIATION 5: Origin of subscapular artery at the level of anterior circumflex humeral artery and posterior circumflex humeral artery**

The subscapular artery which is the first branch of third part of axillary artery usually originates at a higher level than circumflex arteries. The variation observed in figure 5, was that the origin of subscapular artery was from the lower level (i.e.) at the site of origin of anterior circumflex humeral artery and posterior circumflex humeral artery. The subscapular artery was subsequently divided into circumflex scapular artery and thoracodorsal artery and both the branches of subscapular artery had normal course.

**Patil et al (2016)** noted a unique variation of a common trunk from first part of axillary artery which gave origin to all the branches of the third part of axillary artery <sup>6</sup>.

**Hattori et al (2013)** reported that axillary artery branching patterns are extremely variable and mostly subscapular artery and posterior circumflex humeral artery are involved in the variations <sup>7</sup>.

**Ramesh et al (2008)** reported that 30% subscapular artery arose from common trunk with posterior circumflex humeral artery, occasionally subscapular artery, circumflex humeral and profunda brachii. The branches of brachial plexus surrounded the common vessel instead of axillary artery <sup>8</sup>.

**Sazegar et al (2013)** presented a case report of rare variations in branches of axillary artery in which, subscapular artery from third part of axillary artery was sandwiched between the two roots of median nerve at its origin. The anterior circumflex humeral artery, posterior circumflex humeral artery originated from subscapular artery<sup>9</sup>.

**Astik et al (2012)** <sup>10</sup> and **Vasuki et al (2015)** <sup>11</sup> observed from third part of axillary artery, a common trunk gave origin to anterior circumflex humeral artery, posterior circumflex humeral artery, subscapular artery and profunda brachii artery in five cadavers.

**Suman et al (2016)** observed that subscapular artery gave branch to subscapularis and continued as circumflex scapular artery through upper triangular space without giving the customary thoracodorsal artery branch. In this case, thoracodorsal artery was a branch from lateral thoracic artery. Also, noted an aberrant subscapular artery which emerged from postero-inferior surface of third part of axillary artery in another cadaver <sup>12</sup>.

**Farhan et al (2010)** did a study on 26 embalmed upper limb and observed the following variations: subscapular artery branched out into circumflex scapular artery and thoracodorsal artery occurred in 77%. The subscapular artery originated from lateral thoracic artery in 7%. Absence of subscapular artery was in 2.5%. The posterior circumflex humeral artery originated from four different sources: from third part of axillary artery in 77%, from subscapular artery in 11%. from deep brachial artery in 9% and from lateral thoracic artery in 2% <sup>13</sup>.



Figure 1 : Variation 1

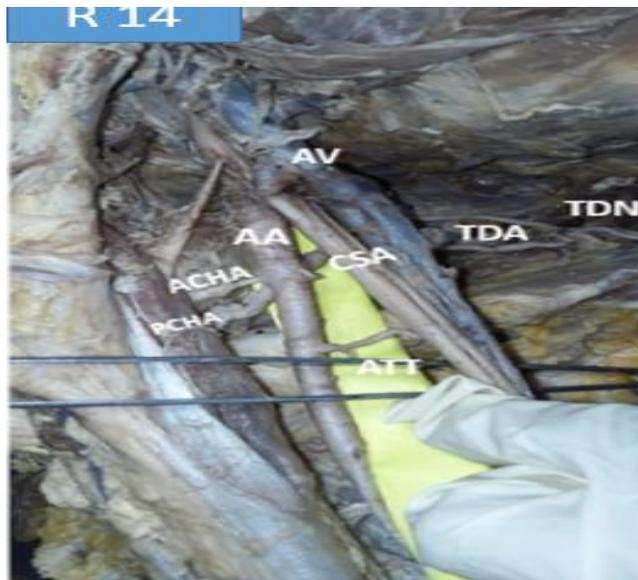


Figure 2: Variation 2

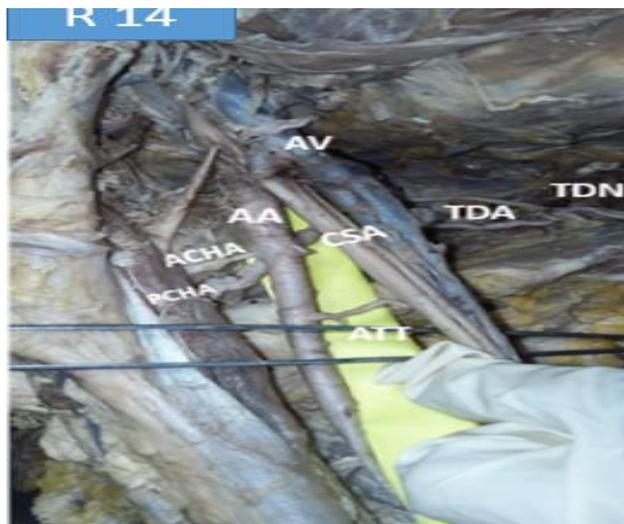


Figure 3: Variation 3



**CONFLICT OF INTEREST**

There are no conflicts of interest.

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