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Anatomical evaluation of lateral thoracic artery in cadavers in North Indian population

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Abstract
The lateral thoracic artery follows the lower border of the Pectoralis minor to the side of the chest, supplying the Serratus anterior and the Pectoralis, and sending branches across the axilla to the axillary glands and Subscapularis; it anastomoses with the internal mammary, subscapular, and intercostal arteries, and with the pectoral branch of the thoracoacromial. Based on the literature findings the present study was planned to evaluate the arterial pattern of lateral thoracic artery in human cadavers. As this study is helpful to know the type and frequency of vascular variations.
The present study was planned in Department of Anatomy in Patna Medical College to assess the arterial pattern of lateral thoracic artery in human cadavers. The study was planned on 30 cadaveric subjects. The axillae from embalmed cadavers allotted for dissection in the Department of Anatomy used for the study.
The knowledge of these variations is necessary for the surgeons considering the frequency of procedures performed in this region. The absence of branches from the second and third parts of axillary artery may be responsible for compromised collateral circulation between the branches.

Keywords: lateral thoracic artery, axillary artery, cadaveric study

Introduction
The lateral thoracic artery (*A. thoracalis lateralis*; long thoracic artery; external mammary artery) follows the lower border of the Pectoralis minor to the side of the chest, supplying the Serratus anterior and the Pectoralis, and sending branches across the axilla to the axillary glands and Subscapularis; it anastomoses with the internal mammary, subscapular, and intercostal arteries, and with the pectoral branch of the thoracoacromial.
In the female it supplies a lateral mammary branch which turns round the free edge of the Pectoralis major and supplies the mamma [1].
The lateral thoracic artery is a branch of the second part of the axillary artery. The lateral thoracic artery originates from the medial surface of the axillary artery, posterior to the distal part of pectoralis minor. It courses inferomedially along the inferior border of pectoralis minor to the anterior surface of serratus anterior. It anastomoses with the internal thoracic and intercostal arteries as well as with the superior thoracic artery [2].
It circulates oxygenated blood towards lateral areas of the breast as well as upper thorax. Branching off via the axillary artery, the lateral thoracic tracks the pectoralis minor muscle's lower boundary. Alongside the chest, it supplies the serratus anterior muscle.

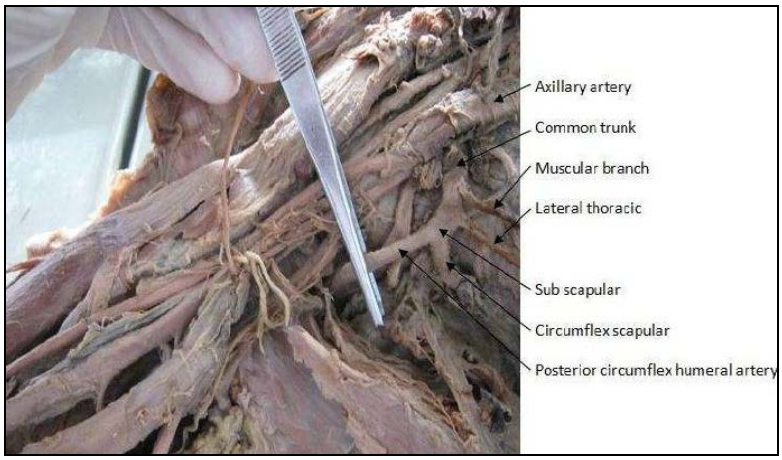

Fig 1

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 so 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 thoracoacromial and lateral thoracic arteries and distal part (third part) gives subscapular artery, anterior and posterior circumflex humeral arteries [3]. 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 [4]. On the basis of the origins of the branches, De Garis & Swartley [5] described 23 different types of axillary artery. According to them, there is a greater tendency in the Negro than in White persons towards clumping of the branches and arising in common. Saeed *et al*. [6] reports, a bilateral common subscapular-circumflex humeral trunk (3.8%) emerging from the 3rd part of the axillary artery (branching into the circumflex humeral and thoracodorsal arteries) and a bilateral thoraco-humeral trunk arising from the 2nd part of the axillary artery (1.9%) and branching into the lateral thoracic, circumflex humeral, subscapular and thoracodorsal arteries. Trotter and her associates in contrast found a sex difference (common origin of two or more branches being more frequent in females), but no significant differences between the races in males. According to Compendium of Human Anatomic variations [7], the first part of the axillary artery may, in rare cases, give rise to the subscapular artery or supply branch to the subscapular muscles. However, the remaining branches of the axillary artery arising from this subscapular artery (arising from first part) is not reported to the best of our knowledge. There is an extensive collateral circulation associated with the subclavian and axillary arteries, particularly around the scapula. This clearly becomes of clinical significance during injury to the axillary artery. Here we present an unusual variation in which, a collateral branch arose from first part of the axillary artery and gave majority of the branches, which otherwise arise directly from the second and third parts of the axillary artery.

Based on the literature findings the present study was planned to evaluate the arterial pattern of lateral thoracic artery in human cadavers. As this study is helpful to know the type and frequency of vascular variations.

Methodology

The present study was planned in Department of Anatomy in Patna Medical College to assess the arterial pattern of lateral thoracic artery in human cadavers. The study was planned on 30 cadaveric subjects. The axillae from embalmed cadavers allotted for dissection in the Department of Anatomy used for the study. The axillary region was dissected and exposed according to the methods described in Cunningham's Manual of Practical Anatomy. The arterial pattern and variations of PCHA were noted down [8]. The approval of the Institutional ethical committee was taken for the present study.

Inclusion Criteria: Axilla without any deformities.

Results

The 30 specimen axillae obtained from embalmed cadavers allotted for dissection in the Department of Anatomy used for the study. The data were collected and the arterial pattern of the lateral thoracic artery was noted as given below.

Table 1: Sex Ratio

Males	**24**
Females	6
Total	30

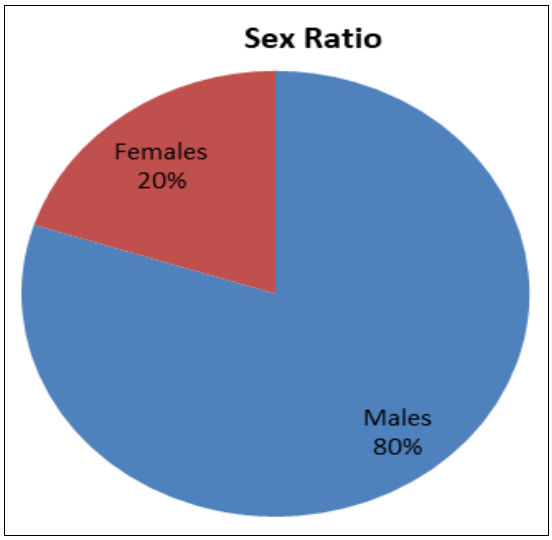

Fig 2

Table 2: Arterial pattern of lateral thoracic artery in Males

Arterial Pattern	**Male**	
Number of Subject	**24**	
Side	**Left**	**Right**
II part of Axillary artery	18	18
Lateral thoracic artery + Thoraco dorsal artery	3	2
Lateral thoracic artery + Subscapular artery	2	2
Double Lateral thoracic artery	1	2

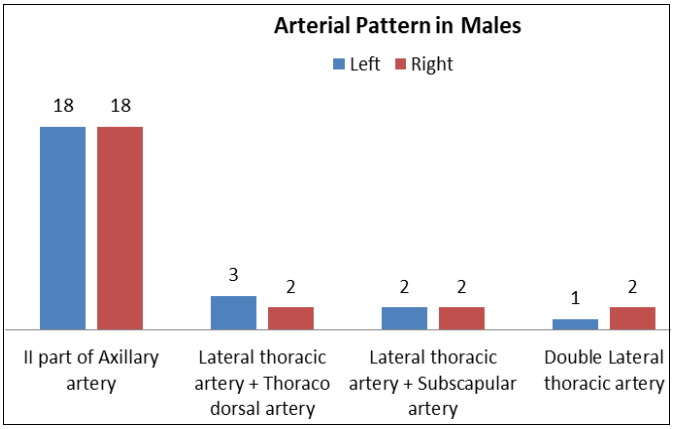

Fig 3

Table 3: Arterial pattern of lateral thoracic artery in Females.

Arterial Pattern	Female	
Number of Subject	6	
Side	Left	Right
II part of Axillary artery	6	3
Lateral thoracic artery + Thoraco dorsal artery	0	2
Lateral thoracic artery + Subscapular artery	0	1
Double Lateral thoracic artery	0	0

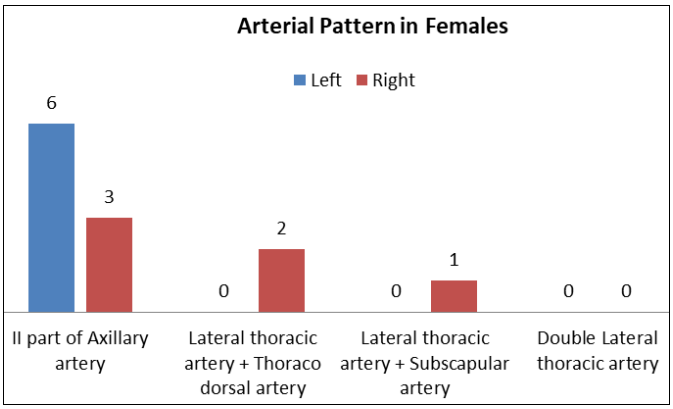

Fig 4

Based on observations made by Trotter M and co-authors (1930), on dissections of 384 arms reported that the lateral thoracic arose from subscapular in 24, whereas in our study it was seen in 3 specimens [9]. The above table signifies that LTA was a constant direct branch from second part of axillary artery with 17 findings in our study. In a study conducted by Ming-Tzu P (1940) on 70 axillae of Chinese population made observations based on mode of origin of the branches of the axillary artery and various types were classified according to the different arrangements of its branches. Of the 20 types, Subscapular Artery with lateral thoracic artery was seen in 11.4% [10].

In a study conducted by Huelke DF (1959) in 89 adult cadavers reported that, the lateral thoracic artery when variant was more often a branch of the subscapular or thoracodorsal artery similar to the variant patterns in our study [11].

Olinger A and Benninger B in their study conducted on 166 axillae found that LTA arose with TDA in 7.2 %, in our study we observed a little higher incidence of 4 cases [12]. Astik R and Dave U, in their study found lateral thoracic artery arising from subscapular artery in 16 out of 80 upper limbs (20%) which was higher compared to our study [13].

Magden O (2007) reported a case in which the lateral thoracic and thoracodorsal arteries arose together from the third part of the axillary artery as “a lateral thoracic – thoracodorsal” common trunk, similar pattern was observed in 5 specimens in our study [14].

Loukas M *et al*. observed that multiple LTAs were present in 3.09% (26 out of 420 specimens) whereas in our study we found in 1 specimens [15].

The study was carried out to show important variations in the branching pattern of lateral thoracic artery, in order to orient the surgeons performing reconstructive plastic surgery and modified Radial mastectomy.

Conclusion

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. The knowledge of these variations is necessary for the surgeons considering the frequency of procedures performed in this region. The absence of branches from the second and third parts of axillary artery may be responsible for compromised collateral circulation between the branches.

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