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Corresponding Author
Maheshwari Myageri,
Dept of Anatomy, KAHER's JGMM Medical College Hubballi. India
myageri@gmail.com

Author Designation
[1]Assistant Professor
[2,3]Associate Professor

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Study on Anterior Circumflex Humeral Artery

[1]Bhavya Bangalore Suresh, [2]Fazal Mehmood Gahlot and [3]Maheshwari Myageri

[1,2]Department of Anatomy, Karnataka Institute of Medical Sciences, Hubli, India
[3]Department of Anatomy, KAHER's JGMM Medical College, Hubballi, India

Abstract
Axillary artery is the continuation of subclavian artery from the outer border of first rib and continues as the brachial artery at the inferior border of the teres major. To study the variations in the origin of anterior circumflex humeral artery and note its pattern 54 axillae from embalmed cadavers allotted for dissection in the Department of anatomy, J.J.M. Medical College, Davangere were used for the study with approval from the institutional ethical committee. There were 22 male and 5 female cadavers, with ages ranging from 60-80 years. In the present study, double anterior circumflex humeral artery was found in 7.4% specimens whereas double posterior circumflex humeral artery was seen in 1.9% specimens. In 3.7% specimen anterior circumflex humeral artery was split into two branches of equal caliber and in 1.9% it was found to arise from posterior circumflex humeral artery. Anterior circumflex humeral artery was fairly constant in origin. Anterior circumflex humeral artery immediately after its origin was found to split into 2 equal branches in 2 specimens whereas in 1 specimen it originated from posterior circumflex humeral artery. Double anterior circumflex humeral artery was found to arise in 4 cases, only in male cadavers, more often on right side. Anterior circumflex humeral artery immediately after its origin was found to split into 2 equal branches in 2 specimens.

INTRODUCTION

The third part of axillary artery takes part in an important arterial anastomoses with branches of subclavian artery, ensuring an adequate blood flow in the upper limb irrespective of the position of the arm (shoulder joint).

The branches of third part of the axillary artery are subject to great variation which is important for surgeons as it is more frequently lacerated by violence than any other artery and during surgeries involved in breast augmentation and radical mastectomy using medial arm skin as free flap.

Particular attention should be given to the anatomical position of third part of axillary artery by vascular surgeons while performing catheterization, cannulation, axillary coronary bypass surgery, micro vascular grafting, creating bypass between axillary and subclavian artery in case of subclavian artery occlusion, during antegrade cerebral perfusion in aortic surgery, reconstruction of axillary artery after trauma, treating aneurysm, thrombosis of axillary artery, haematoma and brachial plexus palsy.

Shoulder joint dislocation and fracture neck of humerus are some of the frequent cases in an orthopaedic clinic. The anatomy of third part of axillary artery is of considerable importance to the orthopaedicians as it can be ruptured in attempt to reduce old dislocations especially when the artery is adherent to the articular capsule.

Anaesthesiologists prefer third part of axillary artery for verification of position of the axillary sheath enclosing axillary vessels and brachial plexus, to perform axillary block anaesthesia as it is safe and has long lasting effect during any surgery pertaining to upper limb[1].

Third part of axillary artery is involved in specific diagnostic imaging technique for vascular lesion which include contrast arteriography, duplex ultrasonography and MRI.

The branches of the axillary artery found in the cadaver are confusing to the student because of the variability from the descriptions and illustrations in textbooks and atlases. Analyses of series of dissections have been reported, but without uniformity of results[2].

The axilla is frequently the site of growths and abscesses, trauma or other pathology, requiring interventions which demand a proper anatomical knowledge, especially of its regional blood vessels and lymphatics, as well as their possible variations. Axillary lymph node dissection is an important part of many cancer operations, particularly those involving removal of the breast. Surgeons should make every effort to preserve and protect, among other structures, the axillary artery or even concomitant arterial reconstruction since compression of the axillary artery and its circumflex branches by the humeral head is a surprisingly common pathologic mechanism. Moreover, the incidence of iatrogenic axillary injuries has risen with the increasing use of transaxillary catheterization by cardiologists and radiologists. Thus, awareness of the presence of anomalies affords a better therapeutic approach to arterial injuries and other interventional vascular procedures[3].

MATERIALS AND METHODS

54 axillae from embalmed cadavers allotted for dissection in the Department of anatomy, J.J.M. Medical College, Davangere were used for the study with approval from the institutional ethical committee. There were 22 male and 5 female cadavers, with ages ranging from 60 to 80 years

Inclusion Criteria:

- All the cadavers available during study period were included.

Exclusion Criteria:

- Deformed axillae were excluded from the study.
- Scalpel and scissor
- Blunt, sharp and toothed forceps
- Measuring tape and scale
- Photography kit

The pectoralis major in each cadaver was exposed after flapping the skin over the pectoral region. This muscle was detached from its points of origin, namely, clavicle, sternum, costal cartilages and aponeurosis of the external oblique muscle, and flapped over the shoulder to expose the pectoralis minor and the axilla. The upper limb was abducted to 90°. Lymph nodes and fat in the axilla were removed carefully in order to expose the axillary vessels and its branches.

The pectoralis minor was left intact. The tributaries of axillary vein were removed but the axillary artery and its branches were carefully cleaned and traced to their territories of supply.

The length of the third part of axillary artery was measured in each specimen with the measuring tape from a point at the lateral border of pectoralis minor to the lower border of teres major muscle and readings were noted. Then the point of origin of subscapular artery, anterior circumflex humeral artery, posterior circumflex humeral artery, circumflex scapular artery and thoracodorsal artery were located. Measurements from the lateral border of pectoralis minor muscle to the point of origin were taken for each of the branches in each specimen. The findings were noted down.

Photograph of each specimen was taken after dissection, with digital camera and labelled.

RESULTS AND DISCUSSIONS

ACHA was seen arising at a mean distance of 4.43±0.81 cm on right side of male specimens and 4.50±0.84 cm on left side. In female specimens, the mean distance on right side was 4.10±0.37 cm and 3.75±0.53 cm on left side. In case of ACHA, t-value was 0.27 and p being 0.79.

For males, Left v/s Right : X2 = 2.70, p= 0.44, ns

For females, Left v/s Right : X2 = 0.00, p=1.00, ns

In female specimens,'t' and 'p' values for ACHA the values were 0.84 and 0.43 respectively,

For males Left v/s Right: X2 = 0.13, p=0.94, ns

For females Left v/s Right: X2 = 3.28, p=0.19, ns

Left side -Male v/s Female : X2 = 3.23, p=0.20, ns

Right side - Male v/s Female: X2 = 0.93, p=0.63, ns

In male cadavers, ACHA was arising in common with PCHA on left side in 4 specimens (18.2%) and in 2 specimens (9.2%) on right side. Double ACHA was seen in 1 specimen (4.5%) on left side and in 3 specimens (13.6%) on right side. In only one case, (4.5%) ACHA was found to arise from PCHA and it belonged to right side. In 17 specimens (77.3%) ACHA was emanating alone in left side whereas in 16 specimens (72.7%) belonging to right side.

In female cadavers, ACHA either arose in combination with PCHA in 1 specimen (20%) each of left and right sides or as alone in 4 specimens (80%) each belonging to left and right side.

The X2 and p values for males was 2.70 and 0.44 respectively and in females it was calculated to be 0.00 and 1.00 respectively.

On considering the different variations in the branching pattern of the third part of AA. Among 44 male specimens, SSA was found to be variable in 10 specimens (45.5%) and 11 specimens (50%) on left and right side respectively. ACHA was variable in 7 specimens (31.8%) on left and 8 specimens (36.4%) on right side.

In 10 female specimens, SSA was variable in 1 specimen (20%) on left and 4 specimens (80%) on right side. ACHA was variable in 3 specimens (60%) on left and in 1 specimen (20%) on right side.

The X2 and p-values for males 0.13 and 0.94 and for females was 3.28 and 0.19. On taking side into consideration, X2 and pvalue for left side were 3.23 and 0.20 and for right side were 0.93 and 0.63 respectively.

In the present study, 54 axillae were dissected, length, point of origin of branches, branching patter of third part of axillary artery were observed, comparison of caliber between ACHA and PCHA were noted and compared with the earlier studies by various workers.

In the present study, the length of the third part of axillary artery was as short as 4.7 cm and as long as 8 cm, average length being 6.04±0.76 cm was observed in 54 axillae. This correlated with the length mentioned by Morris to be about 7.5cm[4].

Anterior circumflex humeral artery was more frequently a direct branch of third part of axillary artery (75.9%) than from a common with posterior circumflex humeral artery (16.6%). The findings of this investigation concerning ACHA agree closely with previous reports as mentioned in the above table. The incidence of common trunk with PCHA ranged between 11.2%-32.9% in series of Huelke and Pan respectively. Daimi SR reported a case with two trunks of PCHA, the diameter of which were larger as compared to diameter in ACHA. This correlated with present study (Specimen 32 ML)[8].

Huelke DF in his study on 89 cadavers mentioned that posterior circumflex was arising in 28% distal to

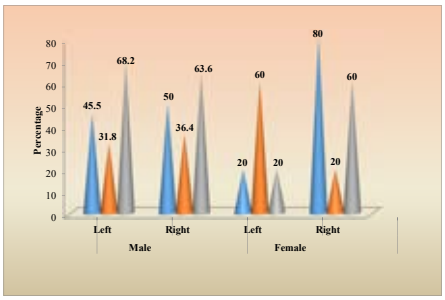

Fig. 1 : Variation in branching pattern in third part of axillary artery

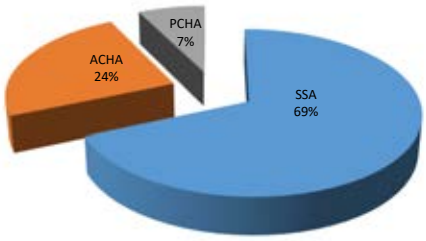

Fig. 2: Comparison Among the Branches of Third of Axillary Artery Proximal to Distal in Origin

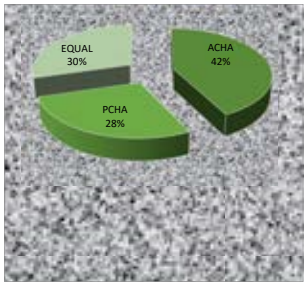

Fig. 3: comparison of point of origin of acha and pcha proximal to distal

Table 1: Arterial pattern of anterior circumflex humeral artery (ACHA)

	Male				Female			
Arterial pattern	**Left (n = 22)**		**Right (n =22)**		**Left (n = 5)**		**Right (n = 5)**	
	No.	Percentage	No.	Percentage	No.	Percentage	No.	Percentage
ACHA+PCHA	4	18.2	2	9.2	1	20	1	20
ACHA from PCHA	-	0	1	4.5	-	-	-	-
ACHA alone	17	77.3	16	72.7	4	80	4	80
Double ACHA	1	4.5	3	13.6	-	-	-	-

Table 2 : Type of branching pattern in third part of axillary artery

	Normal				Variation			
Artery	**Left**		**Right**		**Left**		**Right**	
	No.	Percentage	No.	Percentage	No.	Percentage	No.	Percentage
In male cadavers								
SSA	12	54.5	11	50	10	45.5	11	50
ACHA	15	68.2	14	63.6	7	31.8	8	36.4
PCHA	7	31.8	8	36.4	15	68.2	14	63.6
In female cadavers								
SSA	4	80	1	20	1	20	4	80
ACHA	2	40	4	80	3	60	1	20
PCHA	4	80	2	40	1	20	3	60

Table 3 : comparison among the branches of third of axillary artery proximal to distal in origin

Artery	No	Percentage
SSA	37	68.5
Acha	13	24.1
Pcha	4	7.4
Total	54	100

Table 4: comparison of point of origin of acha and pcha proximal to distal

Artery	No	Percentage
Acha	23	42.6
Pcha	15	27.8
Equal	16	29.6
Total	54	100

Table 5 : comparison of sites of origin of ACHA5

		Site of origin in (%)			
Sl. No.	**Name of Author**	**Directly from III part of AA**	**In common with PCHA**	**From DBA**	**Others**
1.	Pellegerini	69.2	24.1	1.9	4.8
2.	Adachi	66.8	21.9	4.5	6.8
3.	DeGaris6	75	15.8	3.3	5.9
4.	Trotter2	76.6	23.4	-	-
5.	Pan	62.9	32.9	1.4	2.8
6.	Huelke5	80.3	11.2	1.7	6.8
7.	Patnaik7	80	16	-	4
8.	Present study	75.9	16.6	5.5	2

anterior circumflex humeral artery whereas present study had a higher incidence of 42.6%[5,6,7].

CONCLUSION

Anterior circumflex humeral artery immediately after its origin was found to split into 2 equal branches in 2 specimens whereas in 1 specimen it originated from posterior circumflex humeral artery. Double anterior circumflex humeral artery was found to arise in 4 cases, only in male cadavers, more often on right side. Anterior circumflex humeral artery immediately after its origin was found to split into 2 equal branches in 2 specimens whereas in 1 specimen it originated from posterior circumflex humeral artery. Subscapular artery was found to be the first artery to originate from third of axillary artery in 37 specimens, anterior circumflex humeral artery in 13 specimens and least was posterior circumflex humeral artery in 4 specimens. The caliber of anterior circumflex humeral artery was found to be equal to posterior circumflex humeral artery in 3 specimens.

REFERENCES

1. Rouholamin, E. and D. Harris, 1990. 1. Axillary block anaesthesia in acute and elective hand surgery : a report on 300 procedures. Ann R Coll Surg Engl., 2: 90-93.
2. Trotter, M., J.L. Henderson, H. Gass, R.S. Brua and S. Weisman, et al 1930. The origins of branches of the axillary artery in white and in American Negroes. Anat Rec., 133-137.
3. Jurjus, A.R., R. Correa-De-Aruaujo and R.C. Bohn, 1999. Bilateral double axillary artery: Embryological basis and clinical implications. Clin. Anat., 12: 135-140.
4. Huelke, D.F., 1959. Variation in the origins of the branches of the axillary artery. Anatom Rec., 135: 33-41.

5. Garis, C.F.D. and W.B. Swartley, 1928. The axillary artery in white and negro stocks. Am. J. Anat., 41: 353-397.
6. Patnaik, V.V.G.,G. Kalsey and S.K. Rajan, 2000. 1. Branching pattern of axillary artery-A morphological study. J Anat Soc India., 2: 127-132.
7. Daimi, S.R., A.U. Siddiqui and R.N. Wabale, 2010. 1. Variations in the branching pattern of axillary artery with high origin of radial artery. Internati Journ of Anato Variation., 3: 76-77.