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CADAVERIC STUDY ON SUPERFICIAL AND DEEP BRACHIAL ARTERY

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ABSTRACT

Background: Sound knowledge of variations of third part of axillary artery is important for surgeons, anaesthesiologists, orthopaedicians, radiologists, interventionists and clinical anatomists considering the frequency of procedures done in this region. **Objective:** a cadaveric study on superficial and deep brachial artery. **Methods**: This study was conducted among 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 **Results:** The third part of axillary artery was found to bifurcate into superficial and deep brachial arteries in 3 specimens (5.6%), in them deep brachial artery gave raise to all 3 branches. **Conclusions:** The bifurcation of third part of axillary artery into superficial and deep brachial artery had a higher incidence in right axilla, all belonging to male cadavers.

Keywords: Superficial brachial arteries, Deep brachial arteries, axillary artery

INTRODUCTION

Reconstructive surgeons are often faced with problems that require replacement of diseased or damaged portions of arterial systems. The subscapular arterial tree offers a predictable and versatile donor site that can meet the needs of many microvascular reconstructions. The advantages of this arterial graft site are the constant vascular anatomy, the adequate size, length, and the ease of its surgical dissection.[1]

Vascular variations frequently have been shown to be accompanied by variations in the nerve plexus. Thus, vascular variations may lead to a failed block if a transarterial approach is employed, because the nerve plexus usually travels with only one branch of the atypical vascular tree. The use of a nerve stimulator or a paresthesia technique may also be problematic in this setting because of the variable path of the nerves. For this reason, practioners may wish to use an ultrasound probe to elucidate the vascular anatomy of the axilla, prior to block, particularly if their primary approach to axillary block is to transfix the artery or if the patient has a diffuse pulse.[2]

The knowledge of 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 of the first part of subclavian and the branches of third part of the axillary artery in case of a block in the axillary artery beyond the first part. Even in surgeries in the pectoral region and in axilla presence of such anomalous branches ought to be kept in mind.[3]

Since the axillary sheath encloses the axillary vessels and the brachial plexus, a brachial plexus nerve block can easily be obtained. The distal part of the sheath is enclosed with finger pressure, and a syringe needle is inserted into the proximal part of the sheath, and the solution is massaged along the sheath to produce the nerve block. The position of the sheath can be verified by feeling the pulsations of the third part of the axillary artery.[4]

Thorough anatomical knowledge of the upper limb is necessary for many medical fields, such as radiodiagnostics, traumatological surgery, oncological surgery, anaesthetic application, etc. The superficially located artery elevates the risk of heavy bleeding in unexpected situations, not only in medical care but also during common personal daily activities.[5]

Successful axillary block necessitates the deposition of local anaesthetic solution around median, ulnar, radial and musculocutaneous nerves. Ultrasound facilitates the identification of anatomical variation, allowing the clinician to adjust technique during axillary brachial plexus block, to provide safe, effective, individualized anaesthesia.[6]

Compression of the third part of axillary artery against the humerus may be necessary when profuse bleeding occurs (eg: Resulting from a stab wound in the axilla).

MATERIALS AND METHODS

This study was conducted among 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.

MATERIAL:

1. Scalpel and scissor 2. Blunt, sharp and toothed forceps
1. Measuring tape and scale 4. Photography kit

METHOD :

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

TABLE – 1 : LENGTH OF THIRD PART OF AXILLARY ARTERY IN COMPARISON TO MALE AND FEMALE SPECIMENS

Length in cm	Left			Right			t*	p
	Min.	Max.	Mean ± SD	Min.	Max.	Mean ± SD		
Male (44 specimens)	4.7	7.0	6.06 ± 0.70	4.8	8.0	6.23 ± 0.84	0.72	0.48 (NS)
Female (10 specimens)	5.0	6.0	5.42 ± 0.38	5.0	6.6	5.74 ± 0.60	1.01	0.35 (NS)

* Unpaired t test, p>0.05, Not significant

In male cadavers, SSA took origin from III part of AA in 18 specimens (81.8%) on left side and in 16 specimens (72.7%) on right side, from II part of AA in 1 specimen (4.5%) on right as well as left, from DBA in 1 specimen (4.5%) and 2 specimens (9.2%) on left and right sides respectively. Whereas in 2 specimens (9.2%) on left and 3 specimens (13.6%) on right, SSA was found to be absent.

In female cadavers, SSA took origin from III part of AA in 4 specimens (80%) on left side and in 2 specimens (40%) on right side, from II part of AA in 1 specimen (20%) on both right and left side. SSA was found to be absent in 2 specimens (40%) only on right side.

The X^2 and p values in males were 0.65 and 0.69 respectively whereas in female the values were found to be 2.67 and 0.26. Considering the side, X^2 and p values on right was 3.92 and 0.27 whereas on left side X^2 was 2.00 and p was 0.57.

TABLE – 2 : ORIGIN OF SUBSCAPULAR ARTERY IN COMPARISION TO MALE AND FEMALE SPECIMENS

Description	Male				Female			
	Left (n=22)		Right (n=22)		Left (n=5)		Right (n=5)	
	No.	%	No.	%	No.	%	No.	%
III part of AA	18	81.8	16	72.7	4	80	2	40
II part of AA	1	4.5	1	4.5	1	20	1	20
DBA	1	4.5	2	9.2	-	-	-	-
Absent	2	9.2	3	13.6	-	-	2	40

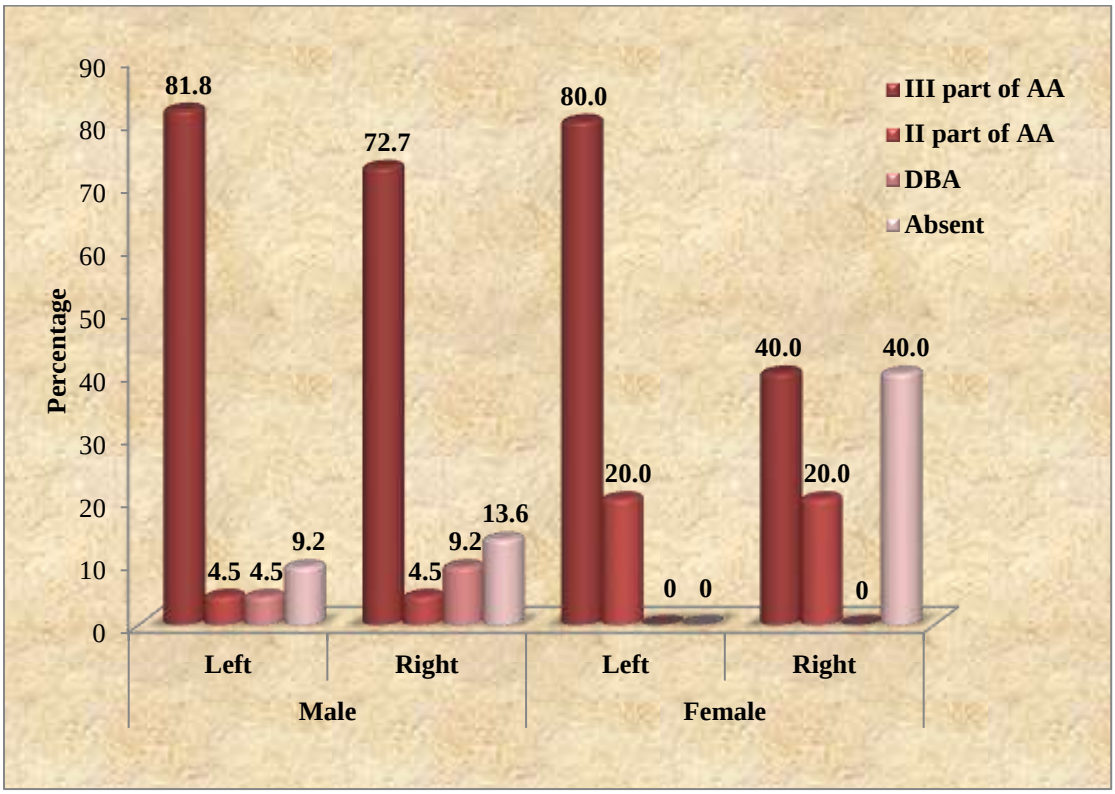
For males Left v/s Right : $X^2 = 0.65$, p=0.69, ns

For females Left v/s Right : $X^2 = 2.67$, p=0.26, ns

Left side -Male v/s Female : $X^2 = 2.00$, p=0.57, ns

Right side -Male v/s Female : $X^2 = 3.95$, p=0.27, ns

GRAPH – 1 : ORIGIN OF SUBSCAPULAR ARTERY IN COMPARISION TO MALE AND FEMALE SPECIMENS



3 specimens out of 54 specimens showed variation in main trunk of III part of AA. Out of which 1 specimen (3.7%) on left and 2 specimens on right side presented with SBA and DBA, whereas in only 1 specimen (3.7%) belonging to left axilla showed PBA arising from main trunk of III part of AA.

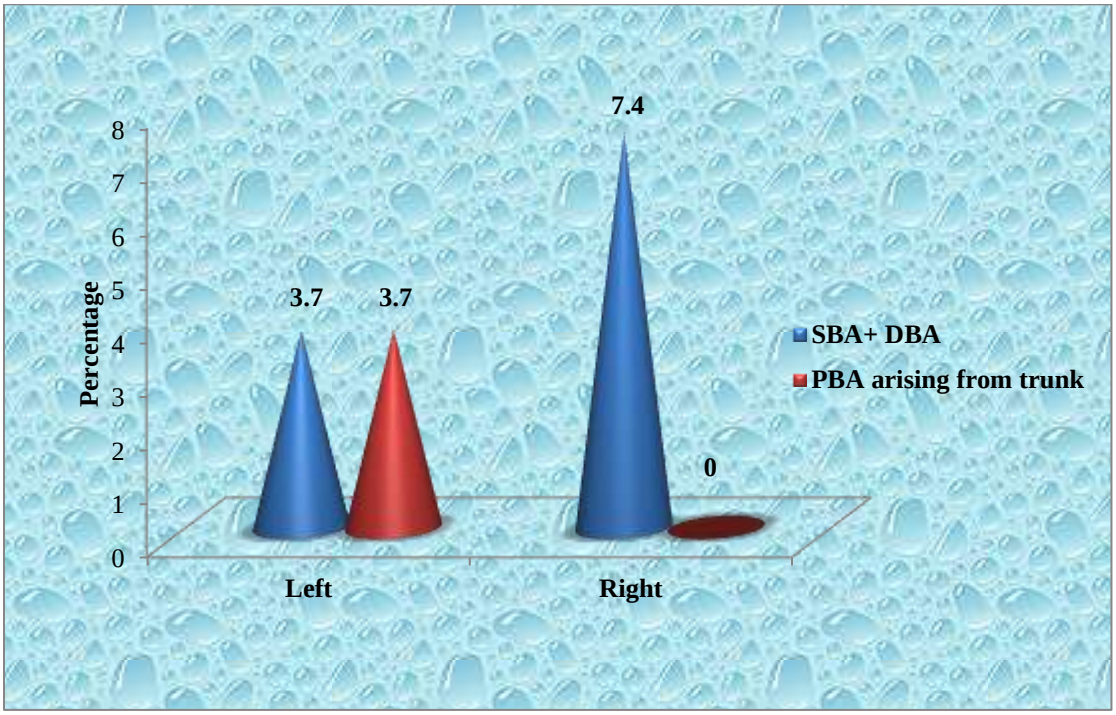
The 'Z' and 'p' values for SBA and DBA were 0.60 and 0.55 respectively and for PBA from trunk of III part of AA were 1.02 and 0.31 respectively.

TABLE – 3 : VARIATIONS OF MAIN TRUNK OF THIRD PART OF AXILLARY ARTERY

Variation	Left (n=27)		Right (n=27)		Left v/s Right	
	Number	%	Number	%	Z*	p
SBA+ DBA	1	3.7	2	7.4	0.60	0.55, NS
PBA arising from trunk	1	3.7	-	-	1.02	0.31, NS

* Z-test for proportions

GRAPH– 2: VARIATIONS OF MAIN TRUNK OF THIRD PART OF AXILLARY ARTERY



DISCUSSION

In present study, III part of AA divided into SBA and DBA in 3 specimens (5.6%). Earlier authors found various incidence of similar variation, Jurjus 3.1% (1/32), Muller 3% (3/100), Adachi 0.24% (1/410), Miller 0.1% (1/960), McCormack 0.1% (1/750), Fuss et al 4.5% (9/200), Bregmen (5-10%), Janevski (5.2%), Karlson (1.2%). Whereas many authors like Maraspin, Cavdar, Yotova, Bhaskar, Jayakumari and O'Donnell (ultrasonographically) have reported one case each of similar variation.[7]

In a similar study conducted by Pandey (51/356) stated incidence of variation to be higher on right axilla in (17.42%) cases and left axilla 11.25% cases. This compared with the present study in 7.4% cases on right and 3.7% on left axilla was lower in incidence. In present study, all 3 cases were found in male (5.6%) specimens in comparison with Pandey's observations of 12.33% in male and 40.63% in female cadavers. The lower incidence can be explained due to small study sample when compared to Pandey (356).[8]

In present study only one specimen (1.9%) presented with PBA arising from III part of AA, where as Keen in a study on 284 specimens observed similar pattern in 26% of cases.

CONCLUSION

The bifurcation of third part of axillary artery into superficial and deep brachial artery had a higher incidence in right axilla, all belonging to male cadavers.

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