Indian Journal of Anatomy

Indexing Information: Index Copernicus, Poland; Google Scholar; Pro Quest, USA; Genamics Journal Seek.

Printed at Saujanya Printing Press, B-303, Okhla Industrial Area Phase-1, New Delhi - 20

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Indian Journal of Anatomy

July - August 2018
Volume 7 Number 4

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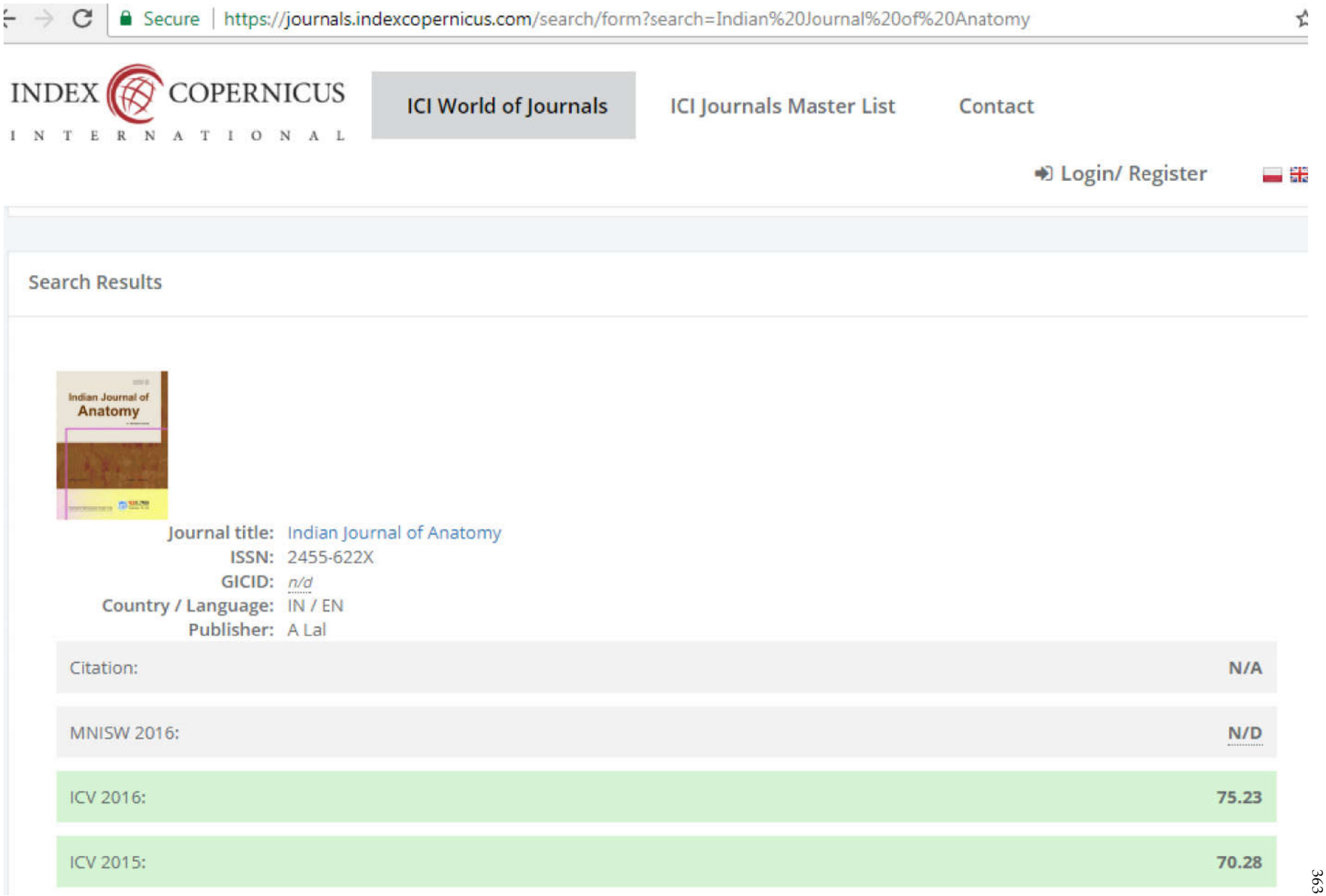
Original Articles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Indian Journal of Anatomy
Journal title: Indian Journal of Anatomy
ISSN: 2455-622X
GICID: n/d
Country / Language: IN / EN
Publisher: A Lal
Citation: N/A
MNISW 2016: N/D
ICV 2016: 75.23
ICV 2015: 70.28

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Original Article

Indian Journal of Anatomy
Volume 7 Number 4, July - August 2018
DOI: http://dx.doi.org/10.21088/ija.2320.0022.7418.1

Morphometric Study of Suprascapular Notch in Adult Dried Human Scapula: A Cross-Sectional Study in South Karnataka

Swaroop N.[1], Shashanka M.J.[2], Mamatha Y.[3]

Abstract

Introduction: The suprascapular notch is the major site for suprascapular nerve compression. *Objective:* To study morphological variations of suprascapular notch in South Karnataka population and to determine posteriosuperior and posterior limits of safe zones for shoulder arthroscopic procedures from posterior approach. *Materials and Methods:* 100 dried adult human scapulae of unknown sex, obtained from Department of Anatomy, Kodagu Institute of Medical Sciences, Madikeri, Karnataka, India. Information regarding various forms of the suprascapular notch was noted. *Results:* Suprascapular notch was present in all Scapula. Based on Rengachary classification, most prevalent was Type III (33%) and least was type VI (1%). Superior Transverse Diameter (STD) =12.19±4.83, Mid Transverse Diameter (STD) =8.22±2.98 , Maximum Depth (MD) =8.46±3.35. The mean distance from SSN to Supraglenoid tubercle was 29.82±4.06 and the distance between the medial wall of the spinoglenoid notch and the posterior margin of the glenoid cavity was 15.19±2.64 respectively. *Conclusions:* Knowing about the morphological variations of suprascapular notch will assist the clinicians in order to understand the concepts of suprascapular nerve entrapment which will help the outcome of the treatment.

Keywords: Suprascapular Notch; Suprascapular Ligament; Suprascapular Nerve Entrapment.

Introduction

Scapula is a flat triangular bone which is also known as the shoulder blade and is situated in the posteriolateral aspect of the thorax, opposite to the 2nd to 7th ribs [1]. The suprascapular notch (SSN) is a depression on the lateral part of the superior border of the scapula, medial to the coracoid process. This notch is bridged by the superior transverse scapular ligament, which will be sometimes ossified and converting it to a foramen which transmits the suprascapular nerve to the supraspinatus fossa. Suprascapular nerve supplies motor branches and ligamentous structures of the shoulder and acromioclavicular joints [2]. Accordingly, this notch is an important landmark of the suprascapular nerve during arthroscopic shoulder operations [3].

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Received | 08.06.2018, **Accepted |** 19.06.2018

The reduction in the area below the ossified ligament leads to Suprascapular nerve entrapment. The first description of Suprascapular nerve entrapment syndrome had given by Kopell & Thompson in 1959 and opined it as one of the cause for shoulder pain & dysfunction [4]. The nerve entrapment commonly occurs at suprascapular & spinoglenoid notches where nerve excursion is limited by bony & ligamentous constraints. Excessive nerve excursion during overhead sports can cause traction neuropathy [5].

The shape of suprascapular notch may vary in each scapula which may alter the distance between it and the supraglenoid tubercle. This distance is important for the determination of a potential safe zone to minimize the risk of iatrogenic injury of the suprascapular nerve during arthroscopic procedures and other open procedures requiring dissection of the posterior glenoid neck [6].

The aim of present study is to study morphological variations of the suprascapular notch in the south Indian population, classify the suprascapular notch into various types as per Rengachary et al. [7] classification and to determine posteriosuperior and posterior limits of safe zones for shoulder arthroscopic procedures from posterior approach and also to compare our results with the studies done by

previous authors. This study will furnish morphological and morphometric data providing an anatomical baseline which will facilitate to devise appropriate surgery of shoulder joint. So, it is of immense help to anatomists, osteologists, anthropologists and orthopaedicians.

Materials & Methods

The present study was conducted for a period of 3 months from June 2017 to August 2017 on 100 dried adult human scapulae of unknown age and sex, obtained from Department of Anatomy, Kodagu Institute of Medical Sciences, Madikeri. Deformed & damaged superior border of Scapulae were excluded from the study. Morphological variations in the shape of suprascapular notch were observed and were classified based on the description of Rengachary et al. [7]. The following dimensions were measured in mm using digital vernier callipers (Fig. 1). The data was analysed statistically.

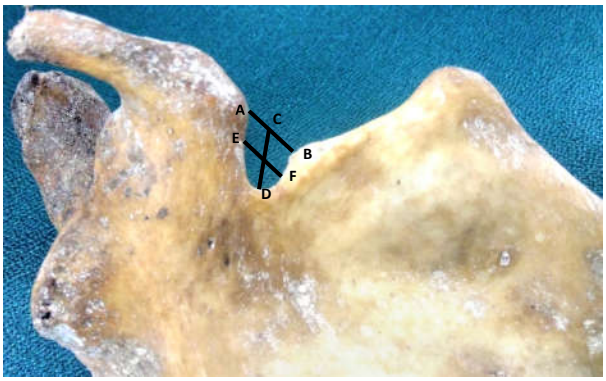

Fig. 1: Showing the procedure to measure Superior Transverse diameter, Mid transverse diameter, Maximum depth.
AB- Superior Transverse diameter, EF- Mid transverse diameter, CD- Maximum depth

Superior Transverse diameter (STD): It is the horizontal distance between superior corners of SSN on the superior border of the scapula.

Maximum depth (MD): It is the distance between the superior corners of the notch to the deepest point of the suprascapular notch.

Mid transverse diameter (MTD): It is the horizontal distance between the opposite walls of SSN at a midpoint of MD and perpendicular to it.

Distance from the base of the suprascapular notch to the supraglenoid tubercle (SGT) and the distance between the medial wall of the spinoglenoid notch (SPGN) at the base of scapular spine and the posterior rim of the glenoid cavity (GC) were measured [8].(Figure 2A , 2B)

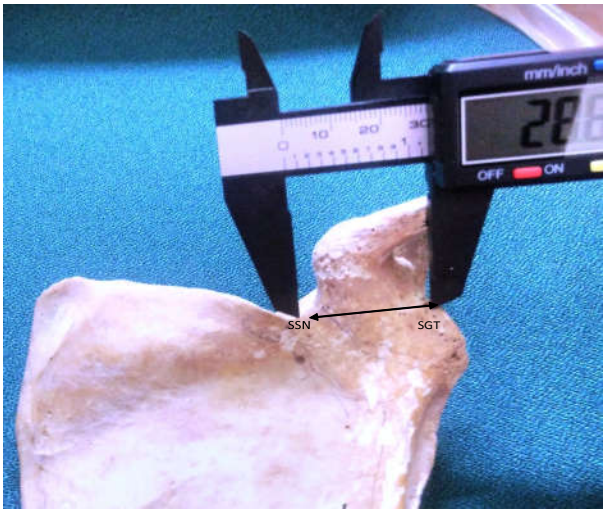

Fig. 2A: Showing the distance between SSN and SGT
SSN- Suprascapular notch, SGT- Supraglenoid tubercle

Fig. 2B: Showing the distance between SPGN and GC
SPGN-Spinoglenoid notch , GC-Glenoid cavity

Results

In present study, the suprascapular notch was observed and classified into 6 types as per the classification given by Rengachary et al. [7] It is as follows:

Type I: wide depression in the superior border of scapula

Type II: wide blunt V shape

Type III: symmetric U shape with nearly parallel lateral margins

Type IV: very small V shape, often with a shallow groove for the suprascapular nerve

Type V: partial ossified medial portion of suprascapular ligament

Type VI: completely ossified suprascapular ligament

According to this classification following types were observed. (Fig. 3)

Out of 100 scapulae studied, the highest number of SSN were of Type III which showed 33% followed by Type I which showed 24% of the total number of scapulae (Table 1).

The highest dimension of Superior Transverse Diameter (STD) and Mid Transverse Diameter (MTD) of SSN were found in Type II which showed 14.28±3.86 and 8.88±3.26 followed by type II which showed 12.05±4.1 and 8.65±2.65 respectively. The Maximum Depth (MD) were highest in Type V which showed 10.46±3.15 followed by Type III which showed 9.72±3.15 (Table 2).

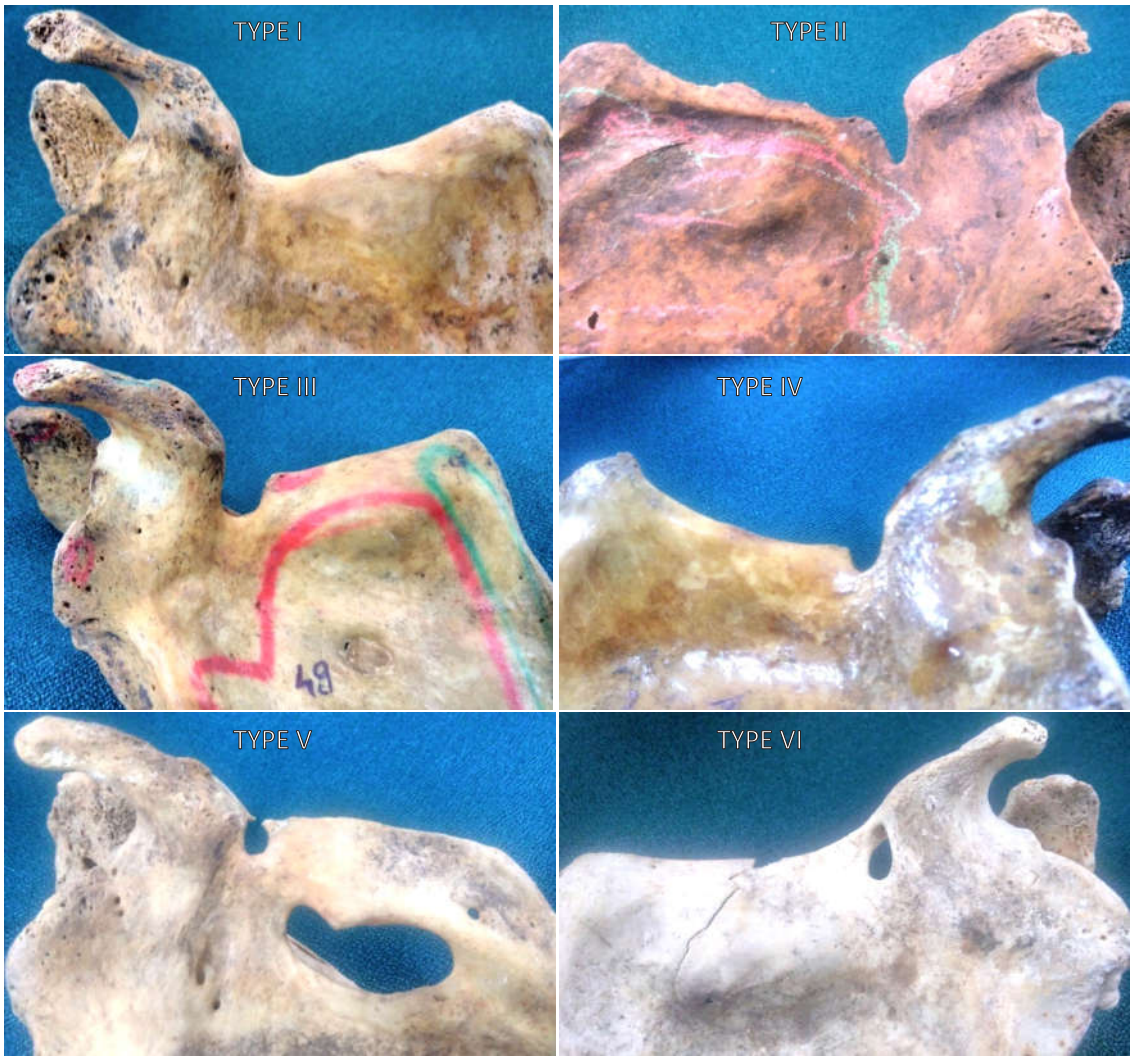

Fig. 3: Showing the Classification of Suprascapular notches

Table 1: Shows the incidence of various types of suprascapular notch

Sl. No.	Types	Total
1	I	24%
2	II	18%
3	III	33%
4	IV	13%
5	V	11%
6	VI	1%

Table 2: Showing dimensions of Suprascapular notch

Sl. No.	Type of notch	STD Mean± SD	MTD Mean±SD	MD Mean±SD
1	I	-	-	-
2	II	14.28±3.86	8.88±3.26	9.24±3.69
3	III	12.05±4.1	8.65±2.65	9.72±3.15
4	IV	8.6±2.45	5.12±1.46	5.10±1.68
5	V	6.5±5.05	7.51±3.19	10.46±3.15
6	VI	-	-	-

Table 3: Shows the distance between the suprascapular notch (SSN) and the supraglenoid tubercle (SGT) and the distance between the medial wall of the spinoglenoid notch(SPGN) and the posterior margin of the glenoid cavity (GC) respectively

Sl. No.	Type of Notch	Mean ±SD (mm)	Mean ±SD (mm)
1.	Type I	29.32 ± 3.42	14.79 ± 2.46
2.	Type II	29.96 ± 4.36	14.96 ± 3.06
3.	Type III	30.24 ± 4.69	15.68 ± 2.83
4.	Type IV	29.09 ± 3.8	14.47 ± 1.18
5.	Type V	30.08 ± 3.7	15.68 ± 3.00
6.	Type VI	32.36	17.39

The distance between the suprascapular notch (SSN) and the supraglenoid tubercle (SGT) and the distance between the medial wall of the spinoglenoid notch (SPGN) and the posterior margin of the glenoid cavity (GC) were highest in Type VI which showed 32.36 and 17.36 respectively (Table 3).

Discussion

The anatomical structure of scapula is complicated because of its own unique features. Surgeons involved in treatment and arthroscopic procedures on shoulder joint should have a thorough anatomical knowledge of scapula. SSN variations have been studied by various authors in different populations. Based on the morphological appearance, Ticker et al. [9] classified suprascapular notch as 'U' and 'V' types. Assessment of V shape suprascapular notch using geometrical parameters was done by Polguj et al. [10]. Based on the dimensions of notch, Natsis et al. [11], had classified into 6 types as follows; Type I – with no notch, Type II- notch with greater transverse diameter, Type III- notch with greater vertical diameter or depth, Type IV- notch converted into bony foramen and Type V – notch with bony foramen. Based on gross features, Iqbal et al. [12] had classified SSN into 3 types J, U and V.

In our present study, based on the shape of SSN, we classified suprascapular notch into six types, which was stated by Rengachary et al. [7]. We observed that type III was common showed 33% which was similar to the observation of most of the other studies. Next common was type I, showed 24% which was similar to the findings of Sinkeet et al. [13], Muralidhar [14] and Usha kannan et al. [15] and it differed from the studies of Rengachary et al. [7], Natsis et al. [11]. and Philip SE et al. [8], which showed type II as prevalent. The incidence of completely ossified transverse scapular ligament (Type VI) in our present study was least (1%) which was similar to the studies of Murulidhar et al. [14], Kalpana et al. [16], showed 1.93% and 2% respectively. However, Vandana and Sudha et al. [5], Usha kannan et al. [15] have reported 12.6% and 10% respectively. We have compared our results with other studies in Table 4. This variability in the shapes of suprascapular notch can be explained by the fact that the shape of the notch is influenced by ossification of coracoid process [17].

In the present study, dimensions of various types of SSN showed that, in 18% of the scapulae STD was less than MD which is comparatively less that of other studies and in 81% of scapulae, STD was greater than MD where the findings were of a greater value than that of Rengachary et al. [7], and Natsis et al. [11].

Dunkelgren et al. [18] have opined that V shaped notches which are having STD more than MD are more likely to be related to suprascapular nerve entrapment because of its smaller area than U shaped notches where depth is more than height . A reduction in the height of the suprascapular foramen may predispose to entrapment of suprascapular nerve and it should be considered as a possible etiologic factor.

Table 4: Comparison of types of SSN with other studies

Authors Studies	Type I	Type II	Type III	Type IV	Type V	Type VI
Rengachary et al [7]	8%	31%	48%	3%	6%	4%
Natsis et al[11]	8.3%	41.85%	41.85%	31%	3%	--
Sinkeet et al[13]	22%	21%	29%	5%	18%	4%
Muralidhar RS[14]	21.15%	8.65%	59.61%	2.88%	5.76%	1.93%
Usha kannan et al[15]	20%	10%	52%	4%	4%	10%
Philip SE et al[8]	9%	36%	38%	8%	6%	3%
Present study	24%	18%	33%	13%	11%	1%

Table 5: Comparison of the distance between the suprascapular notch and the supraglenoid tubercle (SGT) and the distance between the medial wall of the spinoglenoid notch(SGN) and the posterior margin of the glenoid cavity (GC) respectively

Sl. No.	Authors study	Distance between SSN and SGT(cm)	Distance between SGN and GC (cm)
1	Shishido et al [3]	2.3	1.4
2	Sinkeet et al[13]	2.87	1.58
3	Vandana and Sudha et al[5]	2.73	1.3
4	Philip S E et al[8]	2.9	1.6
5	Present study	2.9	1.5

Suprascapular nerve entrapment is an acquired neuropathy secondary to compression of the nerve in the bony suprascapular notch. The signs and symptoms of suprascapular nerve entrapment are weakness of the arm, difficulty in external rotation and abduction, and then, atrophy of the infraspinatus and supraspinatus muscles. This entrapment syndrome is most frequently found in individuals who repeatedly experience stress on their shoulder and those with occupations which require a lot of overhead work involving extreme abduction and external rotation. These include baseball players, weight lifters, tennis players, fencers, hunters using bows, dancers, and figure skaters [6].

The distance between SSN and supraglenoid tubercle is critical during open surgical procedures requiring dissection of shoulder joint from posterior approach. 'Safe zone' is the critical distance within which these procedures are done safely without causing much injury to the suprascapular nerve [5]. Shishido et al. [3], and Sinkeet et al. [13], have reported the mean distance between SSN and supraglenoid tubercle as 23 mm and 28 mm respectively. In the present study the corresponding distance was 29.8mm ± 4.06 mm .The largest distance was observed in type III (30.24±4.69) and least in type IV (29.09±3.8) which is similar to the studies done by Vandana and Sudha et al. [5] study but different from Sinkeet et al. [13], study which showed type IV having longest distance (30.1mm) and type III having least (27.3mm).

Shishido et al. [4], and Sinkeet et al. [13], have reported the average distance between posterior rim of glenoid cavity and medial wall of spinoglenoid notch at the base of scapular spine as 14 mm and 15.8 mm respectively. Corresponding distance in our study is 15.19±2.64 mm. We have compared our results with other authors in Table 5.

According to De Mulder et al. [19], and Warner et al. [20], it has been reported that 23mm from the glenoid rim at the level of the superior rim of the glenoid and 14 mm from the posterior rim of the glenoid at the level of the base of the scapular spine are safe. In the present study the mean distances were 29 mm and 15 mm respectively. Regarding notch and safe zone dimensions, It was commonly noted in type IV followed by type II has the less safe zone distance. Thus, it calls for an extra caution in carrying out shoulder procedures in the above mentioned types of suprascapular notch.

Conclusion

The anatomical knowledge about the variations in the types and different measurements of suprascapular notch and its safe zone is essential for surgeons, for making a proper diagnosis and for planning the most appropriate surgical interventions.

Acknowdegements

We duly acknowledge with thanks, for the cooperation rendered by our Dean & Director, HOD & other staffs of Anatomy Department of Kodagu Institute of Medical Sciences, Madikeri for permitting us to study the scapulae .Also my sincere thanks to I st MBBS students 2016-17 batch for rendering the study material for the present study.

Conflict of interest: Nil

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Original Article

Indian Journal of Anatomy
Volume 7 Number 4, July - August 2018
DOI: http://dx.doi.org/10.21088/ija.2320.0022.7418.2

Importance of Morphometric Analysis of Inferior Epigastric Artery with Reference to Laparoscopic Portal

Arun S. Karmalkar[1], Ashalata D. Patil[2], Anita Gune[3]

Abstract

Introduction: Laparoscopy has been a choice of preference for various surgical procedures for more than two decades. Trocar and cannula are used to make required portals in the anterior abdominal wall for inserting laparoscope. Penetrating a pointed trocar is a blind method. Using the standard confirmed points for making portals, though secure, at times can lead to injury of blood vessels of anterior abdominal wall, mainly Inferior Epigastric Artery (IEA). Anatomical variations of IEA in origin, course, branching pattern and termination are well reported. Hence there is a necessityfor mapping of IEA to avoid vessel injury.

Aim: The aim of present study is to map IEA in terms of its length from its origin, distances from midline extending from pubic symphysis to umbilicus and level of termination with relation to umbilicus.

Materials and Method: Study was conductedon 50 formalin embalmed adult cadavers by direct dissection methodused for routineundergraduate teaching. IEA on both sides was dissected. Length, distance from midline with five reference points and termination with reference to umbilicus was recorded.

Results: Length of IEA - On right side it ranged from 7.2 – 25cms with mean 14.68±4.78, on left side from 8-24.3cms with mean 14.91±3.55.

Our study concluded safety zone 5.3cm±1.92 on either side of midline.

In our study 22% right IEA and 22% left IEA ended below the umbilicus.

Conclusion: The trocars can be safely inserted at 5.3cms±1.92 away from the midline on both the sides. However, preoperative mapping of IEA will help in minimizing vessel injury during laparoscopic procedures.

Keywords: Inferior Epigastric Artery; Length; Abdominalwall; Laparoscopy Injury; Portal; Safe Zone.

Introduction

Laparoscopy has been a choice of preference for various surgical procedures for more than two decades. Trocar and cannula are used to make required portals in the anterior abdominal wall for inserting laparoscope and its accessory instruments after inflating the peritoneal cavity with air. Penetrating a pointed trocar is a blind method. Using the standard confirmed points for making portals, though secure, at times can lead to injury of blood vessels of anterior abdominal wall, mainly Inferior Epigastric Artery (IEA) [1].

Injury to IEA has been reported following lower abdominal wall surgical incisions, abdominal perineocentesis and trocar placements at laparoscopic port sites resulting in the formation of abdominal wall hematomas. Trocar insertion has been reported to be exceptional cause for injury to major blood vessels such as inferior vene cava, aorta and iliac vessels.

Recent studies have shown that the rate of injury to the major blood vessels mentioned above is 0.02 – 0.04% [2] and 0.01 – 0.07% [3]. Anatomical variations of IEA in origin, course, branching pattern and termination are well reported. There is a necessity to study reference points on the abdominal surface to prevent accidental lesions of IEA. Hence mapping of IEA is important to avoid vessel injury [4].

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Received | 14.07.2018, **Accepted |** 23.07.2018

The inferior epigastric artery commences commonly from external iliac artery just above the inguinal ligament. This artery runs superiorly in fascia transversalis to enter the rectus sheath beneath arcuate line. It anastomoses with superior epigastric artery.

Course: It curves forwards in the sub peritoneal tissue and then ascends obliquely along the medial margin of deep inguinal ring, continuing upwards it penetrates fascia transversalis and ascends between rectus abdominis and posterior lamella of rectus sheath.

At its termination it splits into multiple branches which anastomose with branches of superior epigastric, a branch of internal thoracic artery and with lower intercostal arteries. As IEA runs superiorly, it forms infero-medial relation with deep inguinal ring. The vas deferens in males and round ligament of uterus in females turn around lateral and posterior aspect of IEA [5].

In laparoscopic procedures trauma to abdominal wall vessels is 0.2% to 2%. Injury to IEA is one of the commonest complications to face with and the incidence is 3 per 1000 cases [6]. IEAs customarily are accepted to be in the area between 4 and 8 cm from midline and hence staying away from this dangerous strip demarcates safety region for entering anterior abdominal wall [7]. Knowledge of anatomy of IEA and correct trocar placement to avoid injury are as important as managing injury swiftly to avoid major complications [8].

The present study was taken to map the length, course, reference points on anterior abdominal wall and termination of IEA.

Aim

To map Inferior Epigastric Artery in terms of its length from its origin, distances from midline extending from pubic symphysis to umbilicus and level of termination with relation to umbilicus.

Material and Methods

The present study was carried out at D.Y. Patil Medical College, Kolhapur, Maharashtra, India on formalin embalmed cadavers used for undergraduate teaching. The cadavers were donated bodies received to the Institution and department under Bombay Anatomical Act. Total numbers of cadavers dissected were 50 (30 males and 20 females).

Total number of specimens - 100

Period from July 2014 to Dec.2017

A midline incision from xiphisternum to pubic symphysis was taken, sparing umbilicus. Reflection of skin done on both the sides. Linea alba and aponeurosis of external oblique abdominis was defined. Anterior layer of rectus sheath was cut longitudinally to expose IEA. Rectus abdominis was divided in the middle and retracted on both sides. Inferior Epigastric artery was traced.

Length of IEA

Length of IEA was measured from its origin up to its termination on both sides using thread and measuring scale [Fig. 1].

Fig. 1: Length of IEA from origin

Distance from Midline

Five reference points in the midline on linea alba were labelled as A, B, C, D and E. Point A was at pubic symphysis and point E at umbilicus. Reference points B, C and D were marked at the distance of 3.5, 7 and 10.5cm respectively from pubic symphysis [Fig.1]. Distance of IEA from these midline points on both sides were measured using digital Vernier caliper [Fig. 2].

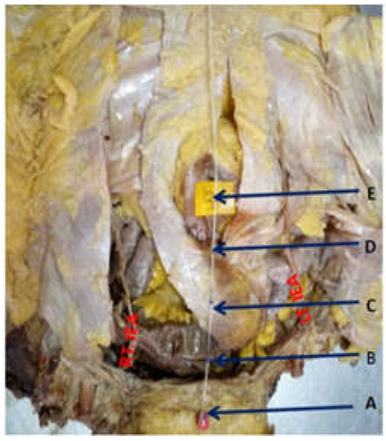


Fig. 2: Reference points A, B, C, D and E

Fig. 3: Distance of IEA from midline at A level

Termination of IEA was noted with reference to umbilicus

At, Above or Below Umbilicus

Observations & Results

Table1: Length of right and left IEA

Right IEA (cm)		Left IEA (cm)		P	Total Mean
Range	Mean ±S. D.	Range	Mean ±S.D.	value	(n=50) (cm)
7.5 – 25	14.68 ±4.17	8 – 24.3	14.91 ±3.55	> 0.66	14.8

Table 2: Measurements from midline to IER at various levels

Measurements in cm	Right side					Left side				
Level	A	B	C	D	E	A	B	C	D	E
Range	4.15- 11.2	3.0- 8.5	2.9 - 6.5	2.8 - 7.00	2.0 -7.03	4.9- 10.7	2.3 -8.9	1.6 - 7.21	2.0 - 7.2	2.0 - 8.67
Mean ±SD	7.86±1.27	5.50±1.13	4.37±1.02	4.11±1.36	4.29±1.74	7.69±1.31	5.47±1.46	4.34 ±1.33	4.24±1.64	4.21±1.70

Table 3: Termination of IEA with reference to umbilicus

IEA	Above Umbilicus	At Umbilicus	Below Umbilicus
Right	11 (22%)	17 (34%)	22 (44%)
Left	4 (8%)	24 (48%)	22 (44%)

Table 4: Comparison of the distance of IEA from the midline at various levels with other studies

Measurements in cm	Right side Mean ±SD					Left side				
Level	A	B	C	D	E	A	B	C	D	E
Manvikar P. R. et al[1]	5.37 ±0.99	4.50 ±0.85	4.06 ±0.88	3.47 ±1.06	3.40 ±1.14	5.30 ±1.20	4.63 ±0.94	4.04 ±0.89	3.52 ±1.09	3.10 ±1.11
Jay Kishor Soren et al[9]	3.5 ±0.9	4.3 ±1.2	5.4 ±1.1	6.5 ±1.3	7.2 ±1.5	3.6 ±1.1	4.3 ±1.2	5.5 ±1.0	6.3 ±1.4	7.3 ±1.6
Saber et al[7]	7.47 ±0.10	-	5.32 ±0.12	-	5.88 ±0.14	7.49 ±0.09	-	5.25 ±0.11	-	5.55 ±0.13
Anandhi.V et al[10]	5.7 ±1.1	-	3.5 ±0.4	-	3.6 ±0.2	6.2 ±1.3	-	3.4 ±0.3	-	3.5 ±0.2
Present Study	7.86 ±1.27	5.50 ±1.13	4.37 ±1.02	4.11 ±1.36	4.29 ±1.74	7.69 ±1.31	5.47 ±1.46	4.34 ±1.33	4.24 ±1.64	4.21 ±1.70

Discussion

Length of IEA

On right side it ranged from 7.2 – 25cms with mean 14.68±4.78, on left side from 8- 24.3cms with mean 14.91±3.55. Manvikar P.R. et al. [1] reported length as 3.5cm on left side and 7cm on right side, which was measured within the rectus sheath.

Distance of IEA from Midline

Distance of IEA from midline to different important levels on the anterior abdominal wall

In our study the minimum and maximum distance at the level A, on right was 4.15cms and 11.2cms respectively and on left side was 4.9cms and 10.7cms respectively. Mean distance of IEA from midline at A level was 7.86±1.27cms on right side and 7.69 ±1.31cms on left side which coincides with the study of Saber et al. [7].

Mean distance of IEAfrom midline at level A is more than the Manvikar P. R. et al. [1], Jay Kishor Soren et al. [9] and Anandhi V et al. [10] study (Table 4).

In our study the minimum and maximum distance at the level B on right was 3cms and 8.5cms respectively and on left side was 2.3cms and 8.9cms respectively. The mean distance of IEA

from midline at level B was 5.50±1.13on right side and 5.47±1.46cms on left side.

The mean distance of IEA from midline at the B level are more than the Manvikar P. R. et al. [1] and Jay Kishor Soren et al. [9] studies (Table 4).

In our study the minimum and maximum distance at the level C on right was 2.9cms and 6.5cms respectively and on left side was 1.6cms and 7.21cms respectively. The mean distance of IEA from midline at level C was 4.37±1.02 on right side and 4.34 ±1.33cms on left side.

The mean distance of IEA from midline at level C is comparable with Manvikar P.R. et al. [1] while it is more than Anandhi V et al. [10] and it is less than Jay Kishor Soren et al. [9] & Saber et al. [7] studies.

In our study the minimum and maximum distance at the level D on right was 2.8cms and 7cms respectively and on left side was 2cms and 7.2cms respectively. The mean distance of IEA from midline at level D was 4.11±1.36cms on right side and 4.24±1.64cms on left side.

The mean distance of IEA from midline at level D is comparable with Manvikar P.R. et al. [1] study, while it is less than the Jay Kishor Soren et al. [9] study.

At the level of the umbilicus, the minimum distance from the midline to IEA was 2cms and maximum distance was 7.03cms.on right side while on left side minimum distance was 2cms and maximum distance was 8.67cms. The mean distance of IEA from midline at level E was 4.29±1.74cms on right side and 4.21±1.70cms on left side.

The mean distance of IEAfrom midline at level E is less than Saber et al. [7] and Jay Kishor Soren et al. [9] studies and more than Manvikar P.R. et al. [1] and Anandhi. V et al. [10] study.

Safe Zone for Laparoscopic Portals

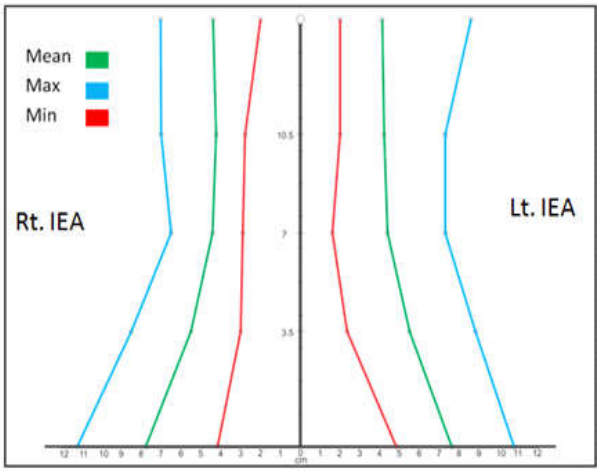
Safe zone is the area on either side of midline with different distance at different level according to the course ofIEA [7,9].

Due to the complexity of new advanced laparoscopic procedures it requires placement of many large bore trocars through the anterior abdominal wall. This can result in accidental injury to the vessels of abdominal wall in 0.2% to 2.0% of cases [6]. In the laparoscopic procedures the most commonly injured vessel is the epigastric vessels [4].

Differentclinical presentations can be seen due to injury to the epigastric vessels [6,8].

Bleeding may be manifested as oozing of blood externally around the port site ordripping internally along the shaft of the cannula into the abdominal cavity during the laparoscopic procedure[11,12].

So it is very important to map the safe zone for the laparoscopic procedures.



Graph 1: Represents safe zone on anterior abdominal wall in the present study

Our study concluded safety zone 5.3cm ±1.92 on either side of midline.

In the present study, on right side, medial limit of safe zone was 2cms and the lateral limit was 11.2cms. while on the left side, medial limit was 1.6cms and lateral limit was 10.7cms.

In our study it was seen that the course of left IEAwas closer to midline than right IEA. Left IEA was more closer to midline at level C (1.6cm) as compared to the right IEA (2.9cm).

Manvikar P. R. et al. [1] found that the strip of safety zone was less than 4 cm from midline. Medial limit of this safety zone found to be lesser than 2 cm on left side as compared with right side. However, the lateral limit of the zone was within 7.5 cm as noted by the measurements.

Saber et al. [7] studied abdominal and pelvic CT images of 100 patients and mapped the course of IEA at various levels. He concluded that epigastric vessels are usually located in the area between 4 and 8 cm from the midline. There was a wide range of variation to the extent of 4 cm.

Praisy Joy et al. [13] in their study on 60 IEAs concluded that trocars can be safely inserted at 5.5cm ± 1 away from the midline to avoid injury to the IEA.

Hurd, William et al. [14] reported that the inferior epigastric artery was 5.6 ±1.0 cm from the midline.

Our study is comparable with above authors.

Termination of IEA with Reference to Umbilicus

Normally IEA ends in its course at level of umbilicus. Study by Manvikar et al[1]showed that in 28% cases IEA ended much earlier. Praisy Joy [15] in his study reported that in 28% cases IEA ended below the umbilicus.

In our study 22% right IEA and 22% left IEA ended below the umbilicus. Absence of arterial course beyond D can serve as a guide for safe trocar insertion if the vessel is mapped preoperatively [1].

Conclusion

Laparoscopic surgery is conventional method for minimal invasive abdominal procedures, through the portals done on anterior abdominal wall. The IEA is a major blood vessel that supplies the anterior abdominal wall and it is always at risk during blind insertion of trocar at laparoscopic procedures.

In conclusion, the trocars can be safely inserted at 5.3cms±1.92 away from the midline on both the sides. In the present study, on right side, medial limit of safe zone was 2cms and the lateral limit was 11.2cms. while on the left side, medial limit was 1.6cms and lateral limit was 10.7cms. Hence, it is better to stay away from this area either medially or laterally to determine the safety zone for the laparoscopic port during laparoscopic surgery to avoid risk of injury to the IEA.However, preoperative mapping of IEA will help in minimizing vessel injury during laparoscopic procedures.

Acknowledgement

We wish to acknowledge the valuable help rendered by the all the supporting staff of the Department of Anatomy D.Y. Patil Medical College, Kolhapur.

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Original Article

Indian Journal of Anatomy
Volume 7 Number 4, July - August 2018
DOI: http://dx.doi.org/10.21088/ija.2320.0022.7418.3

Morphological Study of Superior Articular Facet of Atlas

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Abstract

Aim: The variations of superior articular facets of the Atlas vertebra has been less described in most of the anatomy textbooks though it is significant clinically. Different authors have described the superior articular facets based on constrictions, grooves and shapes. Present study deals with the division of the facet, constrictions, grooves, division, shapes and depth, its frequency and possible explanation. *Materials and Methods:* 100 superior articular facets of 50 dried, adult atlas vertebrae were collected from the bone library, Department of Anatomy, Subbaiah Institute of Medical Sciences, Shimoga. *Results:* Constrictions on medial margin were more frequent, 54% bilaterally followed by constrictions on both the margins about 46% on right side and 44% on left side. Grooves were observed about 46% on right and 44% on left side on the superior articular facets. According to constriction and groove, the facets were divided into complete, incomplete and non division. Non divisions were frequently seen, 54% on right and 56% on left side and complete divisions were less frequent, 8% on right and 2% on left side. Shapes of the facets were also defined according to its division. Kidney- shaped facets (54% bilaterally) were commonly observed followed by dumb-bell shape with left side predominance (36%). Depth of the facets was studied where concave was more common. *Conclusion:* The knowledge of variations of superior articular facets of Atlas is of importance to anatomists, anthropologists and clinicians since asymmetry may lead to restricted movements of atlanto-occipital joint and incomplete decompression of neuro-vascular structures.

Keywords: Cervical Vertebrae; Atlas; Superior Articular Facets; Constrictions; Grooves.

Introduction

The first cervical vertebra, Atlas (C1) has different anatomical features from the other cervical vertebrae. C1 vertebra is an important part of bony anatomy of Cranio-vertebral Junction (CVJ). The stability of the atlas is provided by two symmetrical lateral masses that are united by anterior and posterior arches. These lateral masses are thick, supportive elements composed of both superior and inferior articular facets [1,2]. Superior Articular Facets (SAF) are present superomedially on atlas vertebra occupying most of the upper surface of the lateral mass and lie obliquely, their anterior ends being always nearer to the midline than the posterior ends. Facets are usually concave, with concavity in both longitudinal and transverse directions. The facets with occipital condyles form atlanto-occipital joint which is responsible for nodding movements and also for the weight-bearing of the head [3].

The description of the superior articular facets of the atlas vertebra as found in most of the text-books of anatomy makes no mention of its variations. The different shapes of the facets have been variously described as concave, deeply concave, oval, elongated, kidney-shaped by Schaeffer (1942), Brash (1951), Hamilton et al. (1958), Johnston, Davies & Davies (1958), Breathnach (1958), Woodburne (1961) and Sahana (1962). Some of these authors have also mentioned constrictions or notches on the inner or outer border, or both borders of the facets tending to subdivide them. Bryce (1915), Huber (1936), and Wood Jones (1950) have described the presence of a groove dividing the facet [3].

Any strain on atlanto-occipital joint predominantly induces a tension-like headache which is caused as a result of a prolonged and an inappropriate posture which results from a poor ergonomic adaptation.

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Received | 14.06.2018, **Accepted |** 14.07.2018

Hypermobility of atlanto-occipital joints due to cervical spine malformations and craniovertebral junction abnormalities may give rise to neurological and vascular symptoms. Alterations in the morphology and morphometry of superior articular facet will alter the ergonomics of the joint, leading to restricted movements. The stability of the cervical spine is violated by various traumatic and non-traumatic causes. Instability of CVJ needs surgical correction or long term immobility to attain a solid fusion.

Literature has revealed marked variations in the shape, symmetry, partial or complete separations of the facets and constrictions of SAF of the atlas. The non-metrical/morphological changes which occur in the superior facets of atlas may be a concordant factor for restriction of a cranio-vertebral motion [3, 4, 5, 6, and 7]. So, the present study was undertaken to study the morphologies of the superior articular facets.

Materials & Methods

Fifty dried, adult atlas vertebrae collected from the bone library, Department of Anatomy, Subbaiah Institute of Medical Sciences. Broken and distorted bones were excluded. Morphology of 100 superior articular facets was studied for the division, constrictions, grooves, shapes and depth and its frequency and possible explanation. The study was compared with similar other previous studies.

Results

In 50 atlas vertebrae, the morphology of 100 superior articular facets was studied which includes the shape, the presence of a constriction and groove with a tendency to separate completely or incompletely. Based on these observations, the percentage was calculated for each parameter as shown in the tables and figures. We observed constrictions on medial margin, 54% bilaterally and both the margins, 46% on right side and 44% on left side. Constrictions only on lateral margin were not observed. Margins were absent in 2% on the left side (Table 1). Grooves were present, 46% on right side and 44% on left side of the superior articular facets (Table 2). According to constriction and groove, Superior Articular Facets were divided into complete division, incomplete division and non division. Non divisions were frequently seen, 54% on right side and 56% on left side. Incomplete divisions were next commonly seen, 38% on right side, 42% on left side. Complete divisions were less frequently observed, 8% on right side, 2% on left side. Shapes were defined according to division of Superior Articular Facets. In incomplete division, facets were of two types, Figure of 8 and dumb-bell shaped. In non division, kidney, oval shaped facets were observed. In incomplete divisions, dumb-bell shape was more frequent and common on the left side (36%). In non division, kidney-shaped facets were found with the incidence of 54% bilaterally (Table 3) . In the study of depth of the Facets, concave (96% bilaterally) and flat (4% bilaterally) were observed where the facets were more frequently concave (Table 2). Photographs of the different shapes, constrictions are shown in Fig. 1-5.

Table 1: Constrictions at the superior articular facets of atlas

Side	Both margins	Medial margin	Lateral margin	Absent	Total
Right	23	27	0	0	50
Left	22	27	0	1	50

Table 2: Grooves and depth at the superior articular facets of atlas

Side	Groove		Depth		Total
	Present	Absent	Flat	Concave	
Right	23	27	2	48	50
Left	22	28	2	48	50

Table 3: Divisions and various shapes of superior articular facets of atlas

Side	Complete Division	Incomplete division			Non division			
		Total	'8' shaped	Dumb-bell shaped	Total	Oval	Kidney shaped	Irregular
Right	4	19	2	17	27	0	27	0
Left	1	21	3	18	28	1	27	0

Fig. 1: Complete division showing figure of 8 shaped facets bilaterally

Fig. 2: Complete division on the right side and shallow groove on the left side of superior articular facet

Fig. 3: Dumb-bell shaped facet on the left side

Fig. 4: Non-division showing kidney shaped facet on the right side and concave superior articular facet on the left side

Fig. 5: Bilateral construction on the right and oval shaped facet on the left

Table 4: Comparison of presence of constriction and groove

Study/ Year	No. of Atlas	Constrictions (%)								Grooves (%)	
		Right				Left				Present	Absent
		Medial	Lateral	Bilateral	Absent	Medial	Lateral	Bilateral	Absent		
Shamer Singh [3], 1965	200	4	2.5	67	26.5	3	7	69	21	74	26
Lalit M et.al [5], 2011	30	13.3	6.66	46.6	33.3	10	10	56.6	23.3	56.66	43.33
Londhe Shashikala R et.al [8], 2016	50	28	2	28	42	16	4	34	46	30	70
Present study, 2018	50	54	0	46	0	54	0	44	2	22	28

Table 5: Comparison of shapes of superior articular facets

Study/ Year	No. of Atlas	Shape of superior articular facet (%)									
		Oval		Kidney shaped		Dumbbell shaped		Figure of 8		irregular	
		Right	Left	Right	Left	Right	Left	Right	Left	Right	Left
Shamer Singh [3], 1965	200	26.5	21	6.5	10	67	69	-	-	-	-
Lalit M et.al [5], 2011	30	33.3	23.3	20	20	36.6	33.3	10	23.3	-	-
Londhe Shashikala R et.al [8], 2016	50	34	36	30	20	16	20	6	6	8	8
Present study, 2018	50	0	2	54	54	34	36	4	6	-	-

Discussion

Constrictions and Grooves: The presence of constrictions and grooves of superior articular facet of Atlas in the present study was compared with similar previous studies. Bilateral constrictions on both sides were common in studies done by Shamer Singh and Lalith M et.al [3,5]. In another study done by Shashika Londhe et.al, absence of constrictions was more commonly observed [8]. In present study, constrictions on medial margins were more common bilaterally.

Shamer Singh and Lalit M et al. reported high incidence of presence of grooves. The present study was similar with the observations done by Shashika Londhe et.al where absence of grooves was more common. The results are shown in Table 1, 2 & 4.

The Superior articular facets of Atlas facing superomedially receives the occipital condyles to form the atlantooccipital joint [1]. An atlanto occipital transarticular approach is done for anterior extradural lesions of the cranio vertebral junction [10]. An abnormal hypertrophy of the articular facets is one of the causes for the narrowing of the vertebral canal and consequent neurological deficits [11].

The grooves present in the superior articular facets may give rise to pressure facets which are smooth circular impressions present on the medial sides of the articular surfaces. These pressure facets exert a greater pressure at these sites during movement at the atlanto-occipital joints [3].

Shapes: Based on the constrictions and grooves, the superior articular facets were divided into complete, incomplete and non-division. Under incomplete and nondivision various shapes of the facets were defined and compared with previous studies as shown in table 3 & 5. A study done by Gupta and Goel defined only two shapes, oval (74%) and kidney shaped (24%) [9]. The depth of the facets was also studied and based on the observation, flat and concave types were defined wherein the concave facets were more common.

The incidence of the division of the superior articular facets is of anthropological interest [12]. Phylogenetically, a single superior articular facet is the primitive pattern in primates. The functional modifications due to the acquisition of erect posture and bipedalism resulted in bipartition of the superior articular facet of the atlas during human evolution [13].

Osteophytes may appear on the atlas characteristically in the region of the superior articular facets and lead to Vertebrobasilar ischaemia due to the compression of the vertebral arteries [14].

Conclusion

The knowledge of superior articular facets of Atlas and its variations regarding the constrictions, groove and shapes is of importance not only to anatomists and anthropologists but also to clinicians. Since a little is mentioned about it in literature, this study will be of importance in consideration with the diagnosis and treatment of various clinical conditions like restricted movements at the atlantooccipital joint, compressive lesions like congential osseous craniovertebral junction malformations and also in atlanto occipital transarticular approach done for anterior extradural lesions of the cranio vertebral junction.

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Original Article

Indian Journal of Anatomy
Volume 7 Number 4, July - August 2018
DOI: http://dx.doi.org/10.21088/ija.2320.0022.7418.4

Morphometric Study of Foramen Magnum to Determine the Sex of Skull in Karnataka Population

Santosh Kumar Mulage[1], Ravi Shankar G.[2], Sunil Kadam[3]

Abstract

Content: Foramen magnum is a big foramen found at the base of skull in posterior cranial fossa, it transmits vital structures like spinal cord, vertebral artery. This foramen belongs to occipital bone. The basal region of occipital bone is covered by a large volume of soft tissue and is, therefore, in a relatively well protected anatomical position and as such, classification of sex using occipital bone may prove useful in cases of significantly disrupted remains of skeleton. *Aim:* To study the dimensions of foramen magnum and determine the sex of skulls. *Materials and Methods:* A sample of 100 dry adult human skulls (50 known male and 50 known female) available from the department of Anatomy in RIMS, Raichur and GIMS, Gulbaraga were taken TD, LD of foramen magnum of this skulls were measured with help of vernier's calipers, area of foramen was calculated with the help of formula. *Results:* The longitudinal diameter, transverse diameter and area of Foramen magnum were significantly higher in male skulls than in female skull. *Conclusion:* The observation and results of present study demonstrate significant sexual dimorphism in the dimensions of foramen Magnum of the Karnataka population. Hence, dimensions of foramen magnum help forensic investigator and an anthropologist to determine the sex of disrupted remains of skeleton.

Keywords: Occipital Bone; Foramen Magnum; Longitudinal Diameter; Transverse Diameter and Sexual Dimorphism.

Introduction

Foramen magnum is present in occipital bone. It is oval in shape wider behind, with it greatest diameter being anteroposterior. It contains the lower end of the medulla oblongata. It contains the cover end of the medulla oblongata, the vertebral arteries and spinal accessory nerve [1,2].

Foramen magnum communicates with the posterior cranial fossa of the skill i.e the vertebral canal. It measures about 3.5cm anteroposteriorly and 3 cm transversely. The middle point of anterior margin of foreman magnum is known as the basion [3,4].

Identification of human skeletal remains is of major importance in medico-legal situations such as criminal cases, mass disasters and human rights abuse investigations. One of the principal biological indicators of identity is the sex of the individual. This is relatively easy to achieve when the skeletal remains are complete [5].When the skeleton exists completely, sex can be estimated with 100% accuracy. This estimation rate is 98 % in existence of pelvis and cranium, 95% with only pelvis or pelvis and long bones, 80-90% with only long bones [6]. However, fragmented or dispersed remains result in an incomplete assessment, which may result in some aspects of identity being inconclusive, including sex evaluation. The most sexually dimorphic areas of the human skeleton are the os coxae and the skull. In skull, the basal region of occipital bone is covered by a large volume of soft tissue and is, therefore, in a

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Received | 27.04.2018, **Accepted** | 14.05.2018

relatively well protected anatomical position, and as such, classification of sex using occipital bone may prove useful in cases of significantly disrupted remains [5].

Teixeira has reported the usefulness of occipital condyles and the foramen magnum in determining the sex, particularly with incomplete skeleton or fractured cranial bones [7]. Zaidi and Dayal in their study classified a sample of Indian skulls according to the shape and dimensions of the foramen magnum, reporting differences between the skulls of male and female [8]. Routal et al. claimed high accuracy up to 100% in predicting sex from the foramen magnum region [9]. Uysal et al. reported sexual dimorphism by analyzing the dimensions of the foramen magnum in 3D computed tomography with 81% accuracy in determining the sex [10]. The study of Gapert et al demonstrated significant sexual dimorphism in the cranial base of eighteenth and nineteenth century British samples [5].

Despite its importance, few osteometric studies of foramen magnum size have been published so far in India and abroad. Accordingly, this present study is designed to assess the presence of sexual dimorphism in foramen magnum size and thus determine whether foramen magnum can be effectively used, by a forensic investigator and an anthropologist, as a criterion for sex determination.

Most of the text books do not give any information about measurements of foramen magnum and its sexual dimorphism. So, this study has been taken up which will be beneficial to forensic experts.

Material and Methods

Source of Data

A sample of 100 dry adult human skulls (50 known male and 50 known female) available from the Department of Anatomy in RIMS, Raichur and GIMS, Gulbarga were studied. The skulls were selected for the study based on the following inclusion and exclusion criteria.

Inclusion Criteria

Skulls which are dry, intact of known sex and estimated age of more than 18 yrs.

Exclusion Criteria

Skulls which are wet, fractured, eroded or dismorphic features of entire skull or foramen magnum and estimated age less than 18 yrs.

Methodology

The Longitudinal diameter and Transverse diameter of foramen magnum will be measured using

Vernier's Calipers to within 0.01mm. All the measurements will be made in millimeters (mm).

Longitudinal diameter (LD) is the distance between basion and opisthion. Transverse diameter (TD) is the maximum distance between the lateral curvatures of foramen magnum.

The foramen magnum will be considered to be an oval/ellipse in shape, and the Area is calculated using the formula:

$A = \pi R_1 R_2$ where, $R_1 = LD/2$

$R_2 = TD/2$

$\pi = 22/7$ (mathematical constant)

So, $A = \pi (LD/2) (TD/2)$ mm^2

Results will be tabulated and statistically analyzed using student 't' test, and discriminant analysis, where

- Student 't' test will be used to compare the measurements between the male and the female skulls.
- Discriminant analysis will be used to determine the sex by using foramen magnum dimensions.

Observation and Results

In the present study, TD, LD of foramen magnum, of 50 known male skulls and 50 known female skull, were measured and the area of respective foramen was calculated and the observation and results are shown in the Table 1.

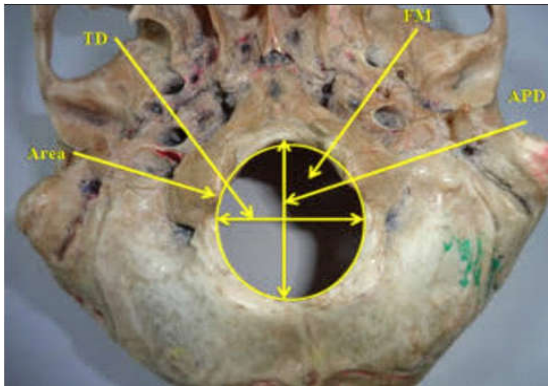

Fig. 1: Diagram showing diameters of Foramen Magnum and abbrevatios used in article:
FM = Foramen Magnum.
APD = Antero-Posterior Diameter.
TD = Transverse Diameter.

Fig. 2: Diagram showing Foramen Magnum of Female Skull

Fig. 3: Diagram showing Foramen Magnum of Male Skull

Table 1: Foramen Magnum measurements in Present Study

Gender	L.D in mm Mean (SD)	T.D in mm Mean (SD)	Area mm² Mean (SD)
Male n =50	34.69 (2.59)	29.49 (2.35)	805.66(100.61)
Female n=50	32.49 (2.35)	26.86(1.59)	687.45(75.05)
Difference in value	2.20mm	2.63mm	118.21mm.sq.

Table 2: Foramen magnum measurements in previous studies

Dimensions	L.D. Mean in mm		T.D. Mean in mm		Area Measure in mm²	
	Male	Female	M	F	M	F
Routal et al. (in 1984)	35.5	32.0	29.6	27.1	819.00	771.00
Sayee et al. (in1987)	34.2	33.5	28.5	28.0	Area not calculated	
Deshmukh et al. (in 2006)	34.0	34.0	29.0	28.0	Area not calculated	
Gapert et al. (in 2009)	35.91	34.71	30.51	29.36	783.82	730.28
Raghavendrababu et al.	36.59	32.57	28.91	28.19	811.67	722.66

Discussion

In the present study the mean LD of foramen magnum in male skulls was 34.69 (with SD2.59) and that in female skull it was 32.49 (with SD 2.35). Mean TD of Foramen Magnum in male skulls it was 29.49 (with SD 2.35) and that in female skulls it was 26.86 (with SD 1.59). Mean area of foramen magnum in male skulls was 805.66 (with SD 100.61) and that in female skulls it was 687.45 (with SD 75.05). P value obtained was <0.001. The mean values and P value obtained show that there is much significance in sexual dimorphism in dimensions of Foramen Magnum.

According to study done by Routal etal in 1984 , mean L.D of male skulls was 35.5 mm and that of female was 32.0 mm. Mean trnasverese (T.D) of F.M. of male skulls was 29.6 mm and that of female was 27.1 mm. Mean area calculated by them, for male skulls F.M. is 819.00mm.sq and that of female it was 771.00. They concluded that there in sexual dimorphism in the dimensions of formen magnum, as they got big differences is mean values of male and female skulls [9].

In one of the study done by Sayer etal in 1987 showed mean value of L.D. of Foramen Magnum in males it was 34.2 mm, in females it was 33.5. Mean T.D. of Foramen Magnum of male it was 28.5 and in females it was 28.0. They did not calculate area of foramen magnum. This study did not show much significance in sexual dimorphism in dimension of foramen magmum [11].

Yasemin gunay and aftinkok in 2000 have measured formen magmum diameters LD & TD, the area of foramen magnum using the mean diameter as the radius for calculation, the mean of formen magnum area was significantly different in male and female skulls 909.91± 126.02 mm2 in males; 819.0±117.24 mm2 in females. The results confirmed that the mean of foremen magmun area in females is lower than in males. Correlation co efficient between the areas of FM and sex was 0.27. Hence area of FM is not a way useful indicators sex identification and can be used only under some circumstances as a supportive finding [12].

Uysal etal in 2005 studied foramen magmum diameter using three dimensional computed tomography (3DCT) and concluded that there was

statistically significant sex differences in diameters of FM. They have mentioned accuracy of sexual dimorphism around 81.1 percent [10].

Deshmukh etal studied foremen magmum in 2006 and they could not find much differences mean values LD & TD of male & female skulls, they did not calculate area of formen magnum. They concluded that by their study there is no accuracy sexual dimorphism in the dimensions of Foramen Magnum [13].

But the study done by Gapert et al in 2009 showed that mean L.D of male FM was 35.91 and that of females was 34.71. The mean TD of male FM was 30.51 and that of female was 29.36. The mean area of FM in males was 783.82 and that of females it was 730.28. They concluded that there was significant sexual dimorphism in the cranial base of 18th and 19th century British samples [5].

The recent study done by RadhaKrishna etal with 55 male skulls and 45 female skulls in South Indian population. The mean LD/APD of FM in males was 34.04 2.36 and in females it was 31.722.14. The mean TD of FM in males was 28.63 1.89 and in females it was 26.59 1.64, and P value was less than 0.05 They have concluded that diameter of FM are more significant in sexual dimorphism [14].

The study conducted by Y.P. Raghavendra Babu and etal in a coastal region of Southern India utilized binary Logististic Regression (BLR) for estimation of sex from the foreman magmum measurements and derived regression models for sex estimation with regard to each dimension of foamen magnum considered individually for its strength in sex determination of the Crania, ROC (Receiver Operating Characteristic Curves drawn for the predicted probabilities obtained from BLR analysis from different variables) analysis in their reveals antero- posterior diameter to be most reliable variable for sex estimation followed by the area of the foremen magmum. TD of FM shows least predictability in sex estimation when compared to the length and area of FM [15].

Key Message

In present study the difference value of male and female mean LD of Foramen Magnum is 2.20 mm, and that of mean T.D is 2.63mm. The difference value of area of Foramen Magnum is 118.21 mm2. All this values are significant and hence L.D, T.D and area of skull can be used to estimate sex of skull. The difference in dimensions of male and female foramen magnum is genetically determined and these dimension will be helpful for forensic expert to estimate sex of skull.

Conclusion

The measurements of foramen magnum and their significance in sexual dimosphirm has not been mentioned in most of the text books of anatomy. Most of the the previous studies show that there is statical significance in dimensions of Foramen Magnum to determine sex of skull. Forensic experts should know the actual dimensions of Foramen Magnum and it's correlation with the sex. Hence the present study was undertaken. With the help of observation and results we can say that sexual dimorphism is present in the foreman magnum.

Acknowledgement

We wish to acknowledge the Dept. of Anatomy, RIMS, Raichur and GIMS, Gulbarga and Mr. Ramesh statistician RIMS, Raichur for their co-operation in this study.

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Original Article

Indian Journal of Anatomy
Volume 7 Number 4, July - August 2018
DOI: http://dx.doi.org/10.21088/ija.2320.0022.7418.5

Accessory Renal Arteries: A Cadaveric Study of 144 Kidneys

Shinde Amol A.[1], Patel Dinesh K.[2], Bharambe Vaishaly K.[3]

Abstract

Background: Accessory renal arteries are one of the most commonly seen variation of renal arteries. Hilar, upper polar and lower polar are the types of accessory renal arteries seen. *Aim:* To find the incidence of various types of accessory renal arteries in maharashtrian population. *Methods:* 144 kidneys are studied for variations in renal arteries like source of origin and number. *Results:* 17 kidneys (11.8%) show presence of accessory renal arteries. Maximum 10 (6.94%) kidneys show lower polar accessory renl arteries. 100% aortic origin for renal arteries is noted. *Conclusion:* Knowledge of variations like accessory renal arteries are very important for surgeons and radiologists during radiological examination before ureteropelvic procedures and renal transplants.

Keywords: Accessory Renal Artery; Renal Transplant; Hilar Renal Artery; Lower Polar Renal Artery; Upper Polar Renal Artery and Supernumerary Renal Artery.

Background

Renal arteries take origin from abdominal aorta bilaterally. Variations in renal vasculature are well documented in literature. Terms like accessory, supernumerary and abberent arteries are used for additional renal arteries. Accessory renal artery can take origin from abdominal aorta and from main renal artery. Various types of accessory renal artery are hilar, upper polar and lower polar [1]. With increase in number of renal transplant surgeries and other urological procedures, the knowledge of variations in renal arteries is very important.

Methods

This study was carried out in department of Anatomy of Dr. D.Y. Patil Medical college, Pimpri, Pune 144 kidneys are observed for variations in renal arteries 72 formalin embalmed cadavers used for routine 1st M.B.B.S. dissection over period of three years [2015 -2017]. Variations in number and source of origin of renal artery are noted.

Results

Accessory renal arteries are noted in 17 kidneys (11.80 %). 3 Hilar accessory renal artery (Fig. 1) are seen in 3 kidneys (2.08%). 10 lower polar accessory renal arteries as seen figure 2 (6.94%) and 4 upper polar accessory renal arteries (2.77%) as seen in figure 3 are observed.

Fig. 1: Hilar accessory renal artery

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Received | 04.05.2018, **Accepted |** 22.05.2018

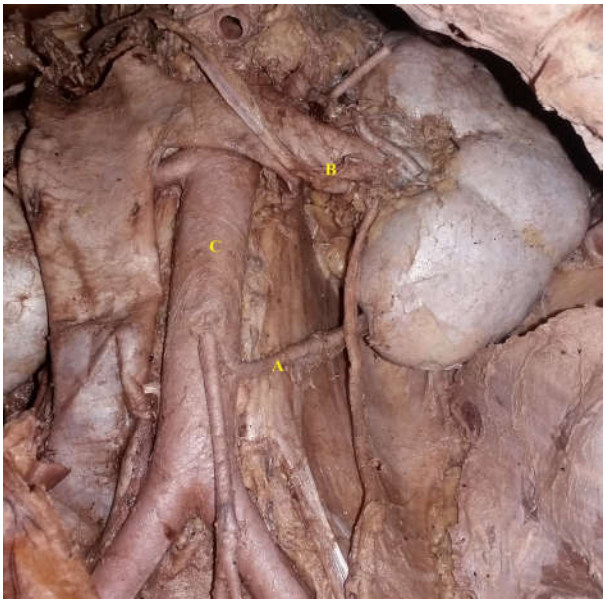

Fig. 2: Lower polar accessory renal artery

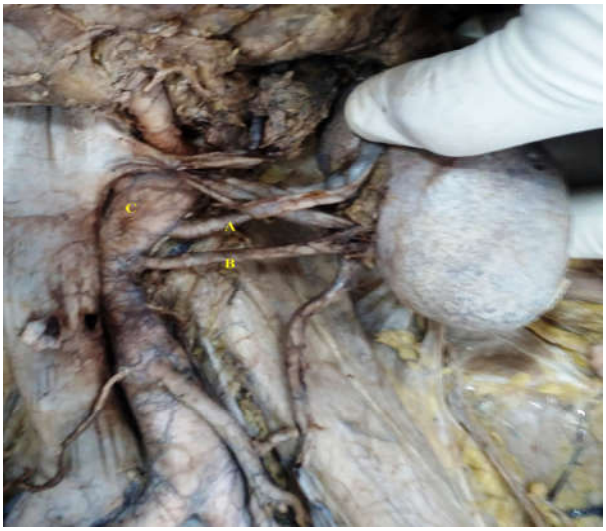

Fig. 3: Upper polar accessory renal artery
A – Accessory renal artery
B – Main renal artery
C – Abdominal aorta

Table 1: Comparison of various studies on Accessory renal arteries [numbers show percentage]

	Mutyalapati and Lokadolalu	R. Chitra	Budhiraja et al	Present study
Accessory renal artery	24	24	59.5	11.80
Hilar accessory renal artery	14	8	29.7	2.08
Upper polar accessory renal artery	2	4	16.2	2.77
Lower polar accessory renal artery	12	12	12.2	6.94

Aortic origin and unilateral variation is seen in all the accessory renal arteries. 15 male (10.41 %) with 3 hilar, 8 inferior polar and 4 upper polar accessory renal arteries and two female (1.39 %) cadavers with lower polar accessory renal artery are seen.

Discussion

During development the primitive dorsal aorta gives rise to ventral and lateral splanchnic arteries, somatic arteries and continue caudally. The lateral splanchnic arteries supply the developing mesonephros,metanephros , supra renal gland and testis or ovary. Three suprarenal branches and one gonadal artery remain. The most cranial suprarenal artery forms the phrenic artery while the most caudal one forms the renal artery. Accessory renal arteries are formed by the persistent lateral splanchnic arteries [2].

Sonic hedgehog factor secreted by notochord induces formation of angioblasts which are precursors of blood vessels and then induces the mesenchyme to express vascular endothelial growth factor. This factor induces the Notch pathway which specifies arterial development by expression of ephrin B2 . Abberent arterial development is seen on misexpression of any of these transcription factors [3].

Mutyalapati and Lokadolalu [4] report 24% incidence of accessory renal arteries. Hilar accessory renal arteries were seen in maximum (14%) kidneys. These findings contraindicate our findings of minimum incidence of hilar (2.08%) variety and total incidence of 11.8%. The researchers mention lower polar variety to be seen in 12% which is more than our finding (6.94%) . Upper polar variety is seen in 2% kidneys which coincides with our study (2.08%).

Budhiraja et al. [1] give a higher incidence (59.5%) of accessory renal arteries . The authors opine that accessory arteries of renal artery origin which supplies the poles are more common causes of polar infarcts. Ureteropelvic junction obstruction is common in kidneys with inferior polar accessory renal arteries.

Kem et al. [5] state that stenosing lesions are seen more frequently in patients with accessory renal arteries. Smaller caliber and more length of these

accessory arteries cause more resistance and predispose underperfusion. These patients had more incidence of undergoing angiography [Kem et al].

In a review of MR angiography data Gupta and Tello [6] studied hypertensive patients to check if hypertension is more prevalent in persons with accessory renal arteries. They reported that 24% patients with hypertension had an accessory renal artery. 20% patients with hypertension and accessory artery showed renal artery stenosis while 30% patients with hypertension and a single renal artery showed stenosis of renal artery. So they conclude that accessory renal arteries should be considered as a vascular anomaly and a direct cause for hypertension.

Thangaraj et al. [7] describe a case report where the testicular artery is found arising from the accessory renal artery. Polycystic kidney was also noted in this case. Renal and testicular artery variations are seen due to anomalous embryological origin of the lateral splanchnic artery from the aorta. Knowledge of the variant origin of renal and gonadal arteries will be of use while performing laproscopic surgeries and transplant operations.

Chitra [8] gives a 24 % incidence of accessory renal arteries in a cadaveric study in Andhra Pradesh. Accessory renal arteries is one of the causes for hydronephrosis. She is of the opinion that endovascular procedures like theurapeutic embolisation and angioplasties should be carried out only after prior radiological examination.

Rainier et al. [9] are of the view to preserve accessory renal arteries during abdominal aorta aneurysm repair surgeries. During abdominal aorta aneurysm surgeries many times the accessory renal arteries are sacrificed, leading to complications. They mention that diameter of the accessory renal artery is exceeding main renal artery and presence of renal disease are the contraindications of exclusion of accessory renal arteries during endovascular repair procedures.

Karmacharya J[10] contradict Rainier et al. [9] in saying that occlusion of accessory renal arteries during endovascular procedures. Even in patients with moderate renal insufficiency. Patients with removal of accessory renal artery during abdominal aorta aneurysm repair did not show renal infarction. So accessory renal arteries don't contribute to endoleaks and can be safely sacrificed.

In a Doppler based study of renal areties in live donor renal allo-transplantation procedures Harraz et al. [11] note Impaired perfusion (IP) in the graft areas supplied by the accessory renal arteries. Comparatively high level of impaired perfusion was seen in grafts with upper polar accessory renal arteries. So to avoid delayed graft function in transplants with upper polar accessory renal arteries, more attention and consideration should be exerted by the surgeon.

Conclusion

We report 11.80% incidence of accessory renal arteries with a higher incidence of lower polar accessory renal arteries (6.94%). With increase in incidence of planned renal transplant surgeries, knowledge about variations in renal vasculature becomes imminent. Keeping in mind these variations, CT and arteriography are indicated before urological procedures, renal transplant and abdominal aorta aneurysm repair. Presence of accessory renal artery is not a contraindication for renal transplant, but prior knowledge of this variation can increase the incidence of positive outcome post surgery. Knowledge of these variations of renal vasculature will be beneficial for the radiologist and surgeon.

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Original Article

Indian Journal of Anatomy
Volume 7 Number 4, July - August 2018
DOI: http://dx.doi.org/10.21088/ija.2320.0022.7418.6

Morphology of Sylvian Fissure: A Cadaveric Study

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Abstract

Sylvian fissure is one of the most important landmarks of human cerebral hemisphere, with necessary surgical landmarks situated around its vicinity. Therefore, a research was designed to study the morphology of this anatomically and surgically significant fissure. The natural upward retraction of the apex of the pars triangularis commonly creates the largest opening in the superficial compartment of the sylvian fissure and provides an area on the convexity where the sylvian fissure is widest, and where it is often safest to begin opening the fissure. 58 formalin fixed cerebral hemispheres were taken and studied. 29/58 (50%) specimens exhibited U pattern while V and Y pattern was exhibited by 19/58 (32.76%) and 10/58 (17.24%) specimens respectively. most common pattern observed is U, followed by V & then Y. This study was then performed and carried further with comparing the difference in morphology of both sides.

Keywords: Morphology; Sylvian Fissure; Pars Triangularis; Middle Cerebral Artery.

Introduction

The human nervous system is the most complex product of biological evolution. The sylvian fissure is the most distinct and consistent landmark on the lateral surface [1]. It is a complex fissure that carries the middle cerebral artery and its branches and provides a surgical gateway connecting the cerebral surface to the anterior part of the basal surface and cranial base [2]. Various previous researches explained about asymmetry of brain, temporal lobe and sylvian fissure [3,4,5]. The medial wall of the sylvian fissure, formed by the insula, is seen only when the lips of the sylvian fissure are widely separated, except in the area below the inferior angle of the pars triangularis, which is often retracted upward to expose a small area of the insular surface [6]. The apex of the pars triangularis is sited directly lateral to the anteroinferior part of the circular sulcus and the anterior limit of the basal ganglia [7,8].

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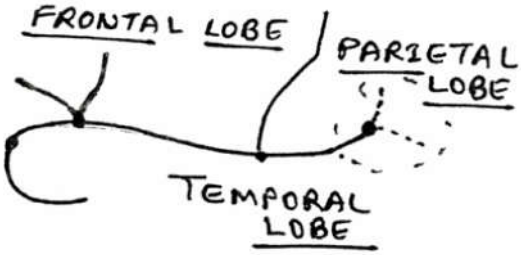
Received | 20.04.2018, **Accepted** | 05.05.2018

The present study is performed to study the morphology of sylvian fissure in 58 formalin fixed cerebral hemispheres. A comparison on both sides was also done.

Material and Method

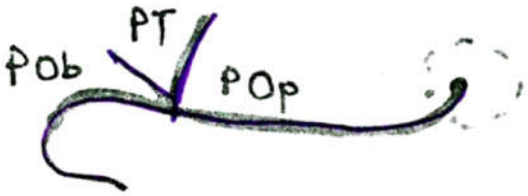
Sylvian Fissure

The present study included formalin fixed 29 brains (58 right and left cerebral hemispheres). Intact arachnoid mater were used to measure lengths of all segment sofsylvian fissure.

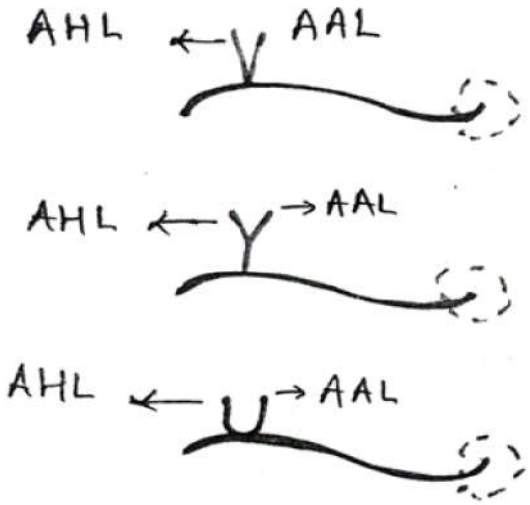


Sylvian Fissure between Frontal lobe, parietal lobe, and Temporal lobe.

P Ob=Pars orbitalis, P T=Pars Triangularis, P Op= Pars Opercularis



Morphology of sylvian fissure V, Y, U patterns based on anterior horizontal limb (AHL) and anterior ascending limb (AAL) were recorded.



Observation and Results

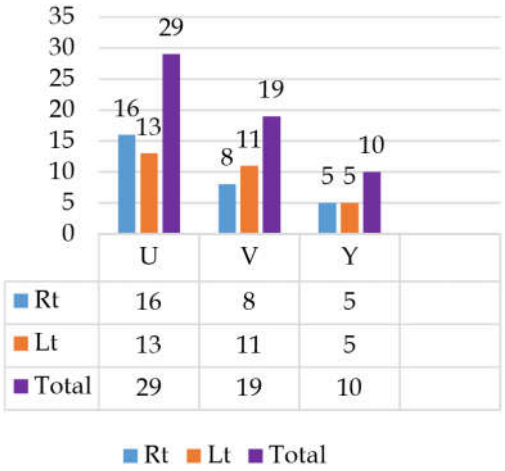
"U, V and Y ''patterns are based upon anterior horizontal limb & anterior ascending limb. In our study of 58 right and left cerebral hemispheres we examined morphology of sylvian fissure related with anterior horizontal limb and anterior ascending limb.

Total 29/58 (50%) specimens exhibited U pattern while V and Y pattern was exhibited by 19/58 (32.76%) and 10/58 (17.24%) specimens respectively. On right side 16/29 (55.17%) specimens exhibited U pattern while V and Y pattern was exhibited by 8/29 (27.58%) and 5/29 (17.24%) specimens respectively. On left side 13/29 (44.82%) specimens exhibited U pattern while V and Y pattern was exhibited by 11/29 (37.93%) and 05/29 (17.24%) specimens respectively.

This indicates that most common pattern observed is U, followed by V. Least common pattern is Y.

Table 1: Sylvian fissure morphology

S. No.	Morphological Parameter	Number (no.)			Percentage (%)		
		Rt.	Lt.	Total	Rt.	Lt.	Total
1	U Pattern	16	13	29	55.17% (16/29)	44.82% (13/29)	50% (29/58)
2	V Pattern	08	11	19	27.58% (8/29)	37.93% (11/29)	32.76% (19/58)
3	Y Pattern	05	05	10	17.24% (5/29)	17.24% (5/29)	17.24% (10/58)



Graph 1: Sylvian fissure morphology

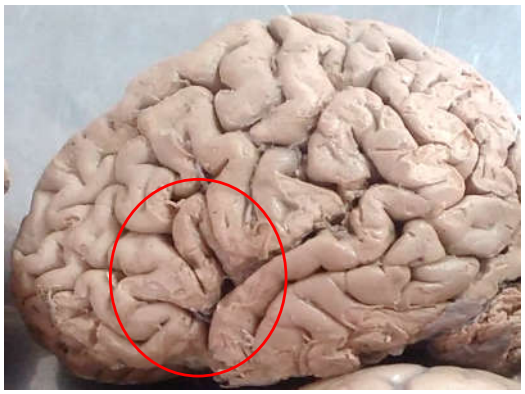


Fig. 1: Sylvian Fissure Morphology (V pattern of anterior horizontal limb and anterior ascending limb)

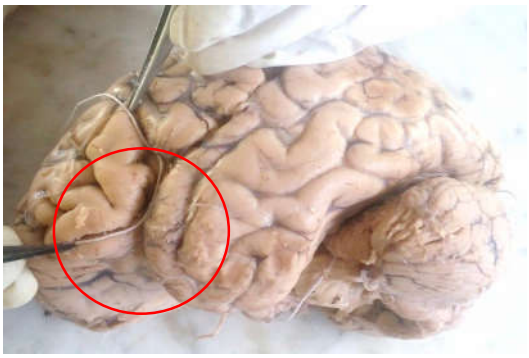


Fig. 2: Sylvian Fissure Morphology (U pattern of anterior horizontal limb and anterior ascending limb)

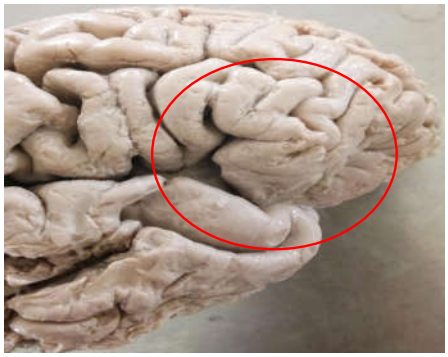


Fig. 3: Sylvian Fissure Morphology (Y pattern of anterior horizontal limb and anterior ascending limb)

Discussion

In our study we examined morphology of sylvian fissure in relation with anterior horizontal limb and anterior ascending limb in 58 cerebral hemispheres. Out of the total 58 specimens 29 (50%) exhibited U pattern while V and Y patterns were exhibited by 19 (32.76%) and 10 (17.24%) specimens respectively. On right side 16/29 (55.17%) specimens exhibited U pattern while V and Y patterns were exhibited by 8/29 (27.58%) and 5/29 (17.24%) specimens respectively. On left side 13/29 (44.82%) specimens exhibited U pattern while V and Y patterns were exhibited by 11/29 (37.93%) and 05/29 (17.24%) specimens respectively. So in our study most common pattern observed is U, followed by V & then Y.

According to Sudakshina et al. (2015) morphology of sylvian fissure related with anterior horizontal limb and anterior ascending limb was observed in 60 cerebral hemispheres. In their study 52/120 (43.3%) specimens exhibited U pattern while V and Y patterns were exhibited by 42/120 (35%) and 26/120 (21.6%) specimens respectively [9]. On right side, 32/60 (53.3%) specimens exhibited U pattern while V and Y patterns were exhibited by 20/60 (33.3%) and 8/60 (13.3%) specimens respectively. On left side, 20/60 (33.3%) specimens exhibited U pattern while V and Y patterns were exhibited by 22/60 (33.6%) and 18/60 (30%) specimens respectively. Thus the result of their study correlates with result of our study.

According to Giyas and Ayberk (2012) 3/13 (20.3%) specimens exhibited U pattern while V and Y patterns were exhibited by 6/13 (40.61%) and 4/13 (30.76%) specimens respectively on right side. On left side 5/14 (35.71%) specimens exhibited U pattern while V and Y patterns were exhibited by 2/14 (14.29%) and 7/14 (50%) specimens respectively [10].

So they observed most common pattern as Y followed by U and V respectively.

Conclusion

The most common pattern of sylvian fissure morphology is based on anterior ascending limb and anterior horizontal limb of pars triangularis area. In our study most common pattern observed is U, followed by V & then Y. Out of the total 58 specimens 29 (50%) exhibited U pattern while V and Y patterns were exhibited by 19 (32.76%) and 10 (17.24%) specimens respectively.

So in our study most common pattern observed is U, followed by V & then Y. The study is of importance to anatomists and neurosurgeons during the time of dissection as well as performing neurosurgery.

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Original Article

Indian Journal of Anatomy
Volume 7 Number 4, July - August 2018
DOI: http://dx.doi.org/10.21088/ija.2320.0022.7418.7

Variations in Axillary Artery and its Branching Pattern

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Abstract

Variation in the branching pattern of axillary artery is commonly seen. Knowledge of these variations is of anatomical, surgical and radiological importance. In present study 50 upper limb of 25 cadavers were dissected to see branching of axillary artery andits course.

We found variations as posterior circumflex humeral artery coming from subscapular instead of third part of axillary artery; unilateral superficial brachial artery; bend and tortuous axillary artery.

Thus variation pattern of axillary artery is important as it is used in different vascular surgeries. Also it helps to determine the brachial plexus relation as cords of brachial plexus are labelled after their relation to second part of axillary artery.

Keywords: Angiography; Axillary Artery; Brachial Plexus; Median Nerve; Vascularsurgery; Variations.

Introduction

Axillary artery; axis artery of upper limb, divided into three parts by Pectoralis minor. Out of six major branches; first branch is Superior thorasic artery from first part that lies upon first slip of origin of the serratus anterior, Thracooacromial and Lateral thoracic arteries from second part, Subscapular artery and anterior and posterior circum flex humeral arteries from third part. Although thisis the classical description of the axillary artery, variations are very common in branching pattern of axillary artery. As indicated by studies there is no fixed pattern for branches of axillary artery [5].

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Received | 27.07.2018, **Accepted |** 08.08.2018

Material and Methods

The axillary arteries belonging to 50 upper limbs of 25 cadavers of Maharashtrian origin (19 males and 6 females) were selected to dissect for routine dissection purposes. 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], sacrificing venae commitantes and resecting the muscles that come in their way. The axillary artery was studied under the following headings: origin of all branches, their courses and variations if present, and photographs were taken for recording.

Observations

The variations are categorised as follows.

- *Superficial brachial artery*

1. All cords of brachial plexus were posterior to axillary artery.
2. Profunda brachi is arising from 3rd part of axillary.
3. Unilateral superficial stem of axillary artery continues as brachial artery and divided into ulnar and radial artery.

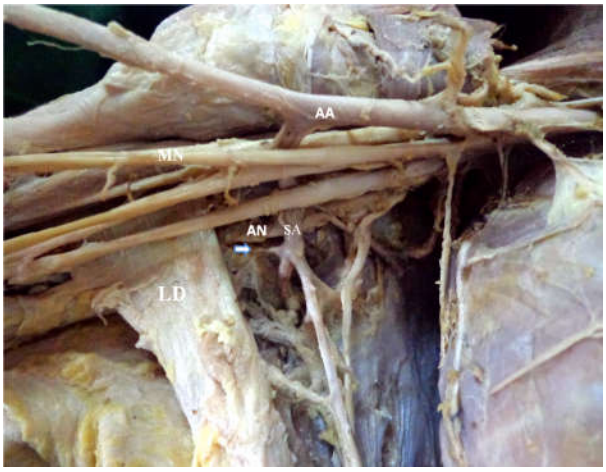

Fig. 1: AA: Axillary artery, MN: median nerve, AN: Axillary nerve, SA: Subscapular artery, LD: Lattissimusdorsi, arrow: Posterior circumflex humoral artery.

Case 1 (fig. 1)

1. Deep stem continued as Profunda artery dividing into anterior circumflex humeral and subscapular artery (4%).

• *Posterior circumflex humeral was coming from subscapular artery.*

(These represent intermediate developmental stages between normal-superficial brachial artery giving rise to the radial and ulnar in the forearm,while deep stem gave rise to subscapular and humeral circumflex vessels and to Profunda brachii artery).

Case 2 (fig. 2)

1. Branches of 3rd part of axillary arising from Profunda or deep stem of axillary artery as it was going between two roots of median nerve and giving branches-anterior and posterior circumflex humeral artery and subscapular artery and then continuing as Profunda along with radial nerve [1].
2. Superior thoracic artery is branch of 2nd part of axillary artery.
3. Posterior circumflex humeral coming from subscapular artery.

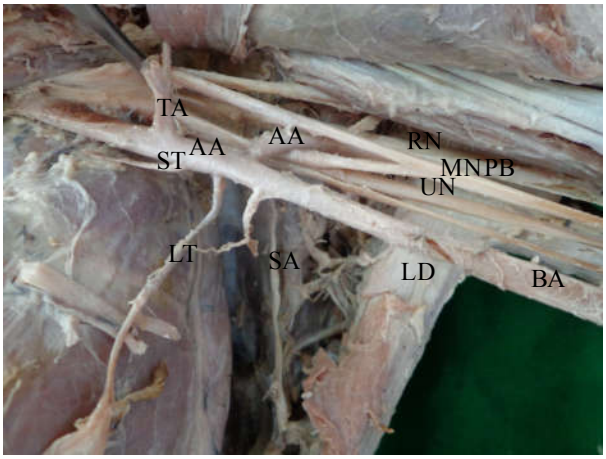

Fig. 2: TA:Thoracoacromial, AA:Axillary artery, ST: Superior Thorasic, RN:Radial nerve, PB: Profunda MN:Median nerve,UN: Ulnar nerve, BA: Brachial artery, LD:Lattissimus Dorsi, LT: Lateral Thoracic,SA:Subscapular artery

Case 3

Posterior circumflex humeral coming from subscapular (fig. 3).

Fig. 3: Posterior circumflex humeral running with axillary nerve coming from subscapular artery.SA-Subscapular artery,arrow-posterior circumflex humeral artery

Case 4 (fig. 4)

At the level of lower margin of Teres major brachial artery gives 5 branches-

Fig. 4: AA: Axillary artery, RN:Radial Nerve, MN: Median nerve, LD: Lattissimus Dorsi, 1-Muscular artery, 2- Profunda Brachi, 3-Muscular artery, 4- smaller deep Brachial, 5- Superficial Brachial artery.

1. Muscular artery 2. Profunda brachi 3. Muscular artery 4. Deep brachial artery 5. Superficial brachial artery. Large superficial brachial artery and smaller deep brachial artery. Superficial was crossing median nerve from medial to lateral and deep was on lateral side; again these two join at elbow and then divide into radial and ulnar artery, further course was normal.

• *Variation in course of axillary artery and its branching pattern*

Bilateral bend of axillary artery in female cadaver before it goes between two roots of median nerve.

Case 5 (fig. 5)

In addition to bend of the artery on left side lateral thorasic artery was branch of subscapular

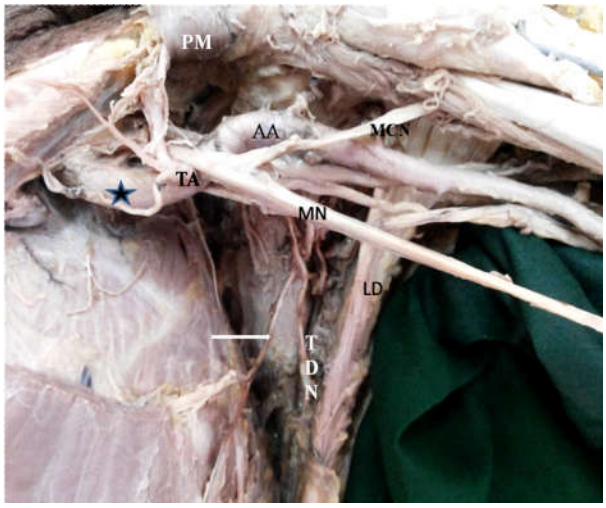

Fig. 5: PM-Pectoralis Minor,TA: Thoracoacromial, AA:Axillaery artery, MN:Median nerve, MCN-Musculocutaneos nerve,LD-Lattissimus Dorsi, TDN –Thoracodorsal nerve. *-Tortuous axillary artey.

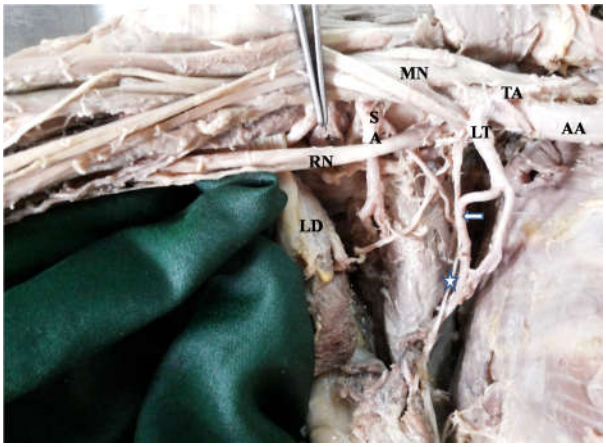

Fig. 5a: AA:Axillary artery MN: Median nerve, RN- Radial nerve,LD: Lattissimus Dorsi, LT: Lateral Thoracic, TA: Thoracoacromial artery.

arteryand Posterior circumflex humeral artery was branch of subscapular artery and rest all branches were following normal course.

Case 6 (fig. 6)

On right side lateral thoracic artery was branch of second part of axillary artery but gave an extra branch running with nerve to lattismus dorsi and posterior circumflex humeral artery was branch of subscapular artery.

Fig. 6: AA: Axillary artery, BA:Brachail artery

Case 7 (fig. 7)

unilateral highly tortuous axillary and brachial artery throughout its course and posterior circumflex humeral artery was coming from subscapular artery.

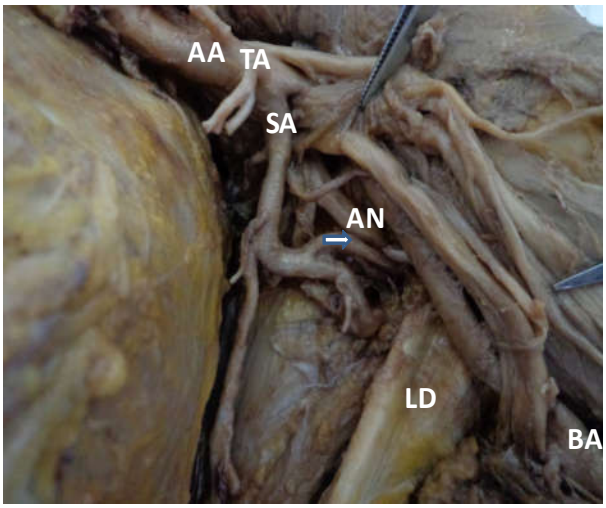

Fig. 7: AA: Axillary artery,TA: Thoracoacromial artery, SA: Subscapular artery, AN:Axillary nerve,LD: Lattissimus Dorsi, BA: Brachial artery

Results

Out of 50 limbs-

Normal pattern-44=88%

Variation-6=12%

Variations in 1st part-0

2nd part-1=2%

3rd part-6=12%

Discussion

Variations in branches of axillary artery are frequently found. Branches may arise together or their subbranches may total anywhere from 5-11 [5]. A Rare but striking anamoly arises when instead of continuing as a single brachial artery, the axillary artery divides in the axilla in two branches. On entering the arm, one of the branches usually run more superficially and may represent the radial or ulnar arteries, the deeper branch usually corresponds to the brachial artery proper [2].

Gaur S et al. [11] reported such variations in 28% cases. It was more common in 3rdpart (8%).

Study by Parveen Ojha et al. [9] found variation in 40% cases. They also found absence of profundabrachii and its replacement by descending branches of posterior circumflex bilaterally.

Same findings were shown by K.G. Rao et al. [6] along with posterior circumflex artery showing hair pin bend like course.

Rajesh Astik et al. [4] found Variation in branching pattern of the axillary artery in 62.5% limbs with 4-8 branches from axillary artery.

Swamy R.S. et al. [7] found 2nd part of axillary artery giving common trunk to divide into lateral thoracic and subscapular artery.

RS Swamy et al. [8] found Unusual Branching Pattern of Axillary Artery Associated with the high origin of Ulnar artery from 3rd part of axillary artery at lower border of teres major.

Yan Ortiz- Pomales et al. [10] found Tortuous Axillary artery aneurysm causing median nerve compression

Present study shows-

1. Arterial variations was present in 12% cases.
2. Posterior circumflex humeral was coming from subscapular artery in 10% cases.This was the commenest finding.
3. Other than branching pattern i.e. bend and tortuosity was present in 6% cases.
4. Variations of 3rd part was the commonest.

Conclusion

Variation in branching pattern of Axillary artery is seen in many studies (12%) in present study. Most of the variations are in 3rd part while no variation 1st part. This variation must be known in orthopedic and vascular surgeries to avoid complications.

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Original Article

Indian Journal of Anatomy
Volume 7 Number 4, July - August 2018
DOI: http://dx.doi.org/10.21088/ija.2320.0022.7418.8

Preference of Teaching Methods among Medical Students: Large Group and Small Group Teaching

Mahendrakar Madhuri A.

Abstract

Background: The lecture is the most commonly used teaching learning method in medical education but the effectiveness of this traditional approach is being questioned. New educational teaching techniques are rapidly appearing in literature. It is been stated that to facilitate student learning interactive teaching learning methods should dominate the curriculum. This study is undertaken to ascertain the impact and study the preference of large group and small group teaching methods on learners. *Aim and Objective*: The aim and objective of this study is to understand the best way to achieve transfer of knowledge and skills between teacher and students that could contribute towards meaningful teaching and learning experiences for medical anatomy. *Materials & Methods*: This is a prospective, mixed (qualitative and quantitative) study seeking preference for teaching method among undergraduate first year MBBS students in subject of Anatomy. Data collection was done with a structured questionnaire containing questions pertaining to their attitude, perception as well as their preference for teaching method, after taking an informed consent. *Results*: In this study, majority of the students preferred small group teaching over large group teaching, for being interactive way of teaching. *Conclusion*: Small group teachings should be incorporated in the subject of Anatomy, along with didactic lectures to enhance active learning among students.

Keywords: Didactic Lectures; Small Group Teaching; Teaching and Learning Methods.

Introduction

The goal of medical education technology is to enhance learning by introducing various effective teaching and learning methods in the medical curriculum. Among the teaching methods employed in medical sciences, the commonest, oldest and integral method is didactic lecture [3]. Lectures are an efficient means of transferring knowledge and concepts to large groups in short time. They can be used to explain concepts, provide core knowledge, stimulate interest and promote direct student learning. However lecture is a passive mode of transferring knowledge with limited feedback from learners. Small group teaching and learning methods are effective classroom methods by which learning takes place among a limited number of participants. It is an interactive session helping the students to develop their understanding of concepts, clinical skills, helps acquire critical thinking and improves strategies and approach to problem solving [2]. Over past few years, a lot of attention has been paid to promoting active learning by adopting interactive student-centred small group teaching and learning approaches in medical education [1,2,3,6,9,11]. Keeping the above facts in mind this study was planned and conducted to understand the preference of students among the two teaching methods – large group teaching represented by lecture and small group teaching represented by demonstration and teaching on dissection table.

Materials and Methods

This is a prospective, mixed (qualitative and quantitative) study seeking preference for teaching method among undergraduate first year MBBS students in subject of Anatomy. The study was initiated after taking requisite clearance from

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Received | 16.04.2018, **Accepted |** 05.05.2018

Institutional Ethics Committee. The students were explained about the purpose of the study, its usefulness for academic improvement and informed consent was taken from each student. Data collection was done with a structured questionnaire containing questions pertaining to their attitude, perception as well as their preference for teaching method – large group teaching represented by lecture and small group teaching represented by demonstration and teaching on dissection table. Feedback from the students on ten parameters for their preference for teaching method – lecture, demonstration and teaching on dissection table was collected and analysed. The attitude and perception of students towards teaching methods was also studied through a questionnaire.

Results

A total of 124 undergraduate first year MBBS students participated in this study. Feedback from students on preference of teaching method viz., lectures representing large group teaching, and demonstration and teaching on dissection table both representing small group teaching were obtained through a questionnaire. Feedback on attitude and perception towards teaching methods were also taken from students. This feedback was given by students based on their perception on teaching methods during the course.

Following are the parameters in a questionnaire seeking student's preference for teaching methods viz., lecture, demonstration and teaching on dissection table [2].

Parameter No.	Questionnaire
1	Which method do you think you are comfortable with? Specify reason.
2	Which method do you think is relevant to the topic taught?
3	Which method helps in understanding the subject better?
4	Which method do you think, will help you in improving your clinical skills?
5	Which method do you think, will give an opportunity for you to clarify your doubts?
6	Which method do you think will motivate you to study further?
7	Which method do you think, the teachers paid enough attention towards you?
8	Which method do you think aroused interest in you towards the subject?
9	Which method do you feel as active way of learning?
10	Which method do you think, was well organized?

The preferences of the students for the teaching methods - didactic lectures, demonstrations and teaching on dissection table and their combinations for the above ten parameters are shown in numbers and percentages in Table 1.

The six parameters in the questionnaire seeking students attitude and perception for teaching methods viz., lecture, demonstration along with their data analysis are shown in percentages in Table 2.

The three parameters in the questionnaire seeking students attitude and perception for teaching on dissection table along with their data analysis are shown in percentages in Table 3.

Table 1: Preferences of the students for the teaching methods

Parameter	L		D		T		LDT		LD		DT		LT	
	Nos	%	Nos	%	Nos	%	Nos	%	Nos	%	Nos	%	Nos	%
1	4	3.23	62	50.00	32	25.81	3	2.42	1	0.81	22	17.74	0	0.00
2	16	13.22	56	46.28	29	23.97	11	9.09	1	0.83	8	6.61	0	0.00
3	6	4.84	45	36.29	50	40.32	4	3.23	1	0.81	18	14.52	0	0.00
4	0	0.00	43	34.68	63	50.81	1	0.81	1	0.81	15	12.10	1	0.81
5	10	8.06	74	59.68	27	21.77	2	1.61	1	0.81	10	8.06	0	0.00
6	9	7.32	50	40.65	44	35.77	0	0.00	3	2.44	16	13.01	1	0.81
7	3	2.44	87	70.73	14	11.38	2	1.63	0	0.00	17	13.82	0	0.00
8	0	0.00	43	34.96	63	51.22	3	2.44	1	0.81	13	10.57	0	0.00
9	3	2.42	37	29.84	70	56.45	0	0.00	1	0.81	12	9.68	1	0.81
10	19	15.32	73	58.87	15	12.10	9	7.26	3	2.42	4	3.23	1	0.81

L - lectures, **D** - demonstrations and **T** - teaching on dissection table and their combinations

Table 2: Attitude and perception for teaching methods – lecture, demonstration

Sr. No.	Parameter		Lecture	Demonstration
1	Preferred time viz., morning / afternoon for lecture and demonstration	8.30am -	81.45%	12.90%
		11.30am -	10.48%	30.64%
		1.30pm -	08.06%	40.32 %
		3.00pm -	0%	16.13%
2	Preferred duration of lecture and demonstration	45min -	44.35%	10.48%
		1hr -	52.42%	36.29%
		1½hr -	00.81%	43.55%
		2hr -	0.24%	09.68%
3	How many consecutive lectures or demonstrations are preferred?	1 -	10.48%	72.58%
		2 -	77.42%	26.61%
		3 -	8.87%	08.10%
		4 -	3.26%	00.00%
4	Teaching aids preferred in lecture and demonstration - which of the following Chalk board, Slides, OHP, LCD ppt	Chalk board -	49.19%	75.80%
		Chalk board & slides -	16.13%	--
		Chalk board & LCD -	--	8.87%
		Chalk board & OHP -	0.16%	0.81%
		LCD ppt –	31.45%	12.09%
		OHP –	0.08%	00.80%
		Slides & OHP –	0.08%	--
		Blank -	--	01.61%
5	How long can you concentrate during a lecture and demonstration?	20min -	08.87%	01.61%
		30min -	41.93%	10.48%
		45min -	39.51%	27.42%
		1hr -	09.68%	37.90%
		1½hr -	0%	19.35%
		2hr -	0%	03.22%
6	You give maximum emphasis on 1. Understanding the topic 2. Taking down notes 3. Fulfilling the attendance criteria by attending lecture/ demonstration Write preference	1 -	41.13%	83.87%
		2 -	17.71%	02.41%
		3 -	08.06%	00.00%
		1,2 -	12.09%	04.03%
		1,3 -	06.45%	03.22%
		1,2,3 -	11.29%	06.45%
		2,3 -	03.22%	00.00%

Table 3: Attitude and perception for teaching on dissection table

Sr. No.	Parameter		Lecture
1	Preferred time viz., morning / afternoon for dissection	8.30am -	08.06%
		1.30pm -	91.93%
2	Preferred duration of dissection	1hr -	14.51%
		1½hr -	34.67%
		2hr -	42.74%
		3hr -	08.06%
3	Preferred Teaching aids with/without guidance of teacher	With -	97.58%
		blank -	02.41%

Discussion

Teaching methods which increase student motivation and enhance learning have evolved through history [2]. Didactic lecture is a primitive, traditional, oldest method used in mass instruction. Lecture is a careful presentation of facts with organised thoughts by a qualified person. It is currently the most conventional educational technique. Lecture provides core knowledge and explains concepts to large groups, stimulates interest and facilitates direct student learning. Students silently and passively receive information. The lecture as a method of imparting knowledge dominates and will continue to have a place in teaching. Lectures cover a large group of learners and are good for transmitting vast amounts of information in short time, so is a economical way of teaching. Information given to the class is uniform in contrast to small group teaching where it can vary from teacher to teacher. This teaching method updates summary of topic from several sources and saves learners time. Lectures are based on teacher controlled thinking and are economical way of using staff time. Disadvantages of lectures are the audience remains passive with limited

feedback from learners. A high caliber of teacher is needed and it does not cater to slow learner, information is quickly forgotten and attention wanes off quickly [1,2,3,5,6,9,11].

On the otherhand small group teaching involves active participation of learners, facilitates understanding of concepts and helps in retention of knowledge. This method facilitates to acquire critical thinking and improves strategies. Small group teaching increases the team work ability, increase student interest and improves critical skills. Students receive immediate feedback on their learning and also help in establishing rapport between facilitator and student. This teaching method helps the students to improve their interpersonal communication skills which will be helpful as professionals. Disadvantages of small group teaching are lot of planning, increased number of teaching staff, immense infrastructure and resources are required [1,2,3,5,6,9,11].

A further consideration with small group teaching is the subjective perspective of what constitutes a small group. A lecturer used to teaching 400 learners in a lecture would define 50 as a small group, while a lecturer used to a group of 50 would define 5-10 as a small group [11].

Large group teaching and small group teaching both have their own advantages and disadvantages, but both the teaching styles shows that learners at some point gain meaningful understanding of concepts but outcome varies and depends on many factors. It can be understood that large group lecturing is therefore ideal for disseminating basic level information on the subject which can act as a guide line for future reading, but in order to provoke deeper interest and understanding, face to face communication is essential. Thus it can be suggested that, both small group teaching and large group lecturing are essential elements for meaningful teaching and learning, and both the teacher and students should be actively engaged in this process [7]. Medical undergraduate education is undergoing major changes with efforts towards making it more interesting [1]. The introduction of an interactive student-centered approach in medical education has dramatically changed the way students learn [8].

In present study, majority of students have given preference for small group teaching in all the ten parameters against large group learning method similar to other studies [1,2,3,5,6,9]. The students have stated that they are comfortable with the small group learning method (demonstration - 50%, teaching on dissection table - 25.81%) than large group learning method. The reasons given for the preference for demonstration are mainly interactive sessions and individual attention and for teaching on dissection table are better understanding, hands on dissection table and visualising parts helps in memorising.

The students have preferred small group teaching methods - demonstration and teaching on dissection table for relevancy of the topic taught and for better understanding. For improving clinical skills students have preferred small group teaching methods - teaching on dissection table (50.81%) and demonstration (34.68%). The students have opted for small group teaching methods for seeking clarification on doubts and teachers attention. In present study, students accepted that small group learning demonstration (40.65%) and teaching on dissection table (35.77%) motivated them more for further studies which is consistent with the findings by Yoo et al [12]. Students have preferred small group teaching, being well organised method for active way of learning which also arouses interest in the subject.

The parameters seeking attitude and perception of students for lecture, demonstration viz.- preferred time, preferred duration, no. of consecutive lectures or demonstrations, preferred teaching aids, concentration during a lecture or demonstration, emphasis on understanding the topic, taking notes and/or fulfilling the attendance criteria were analysed.

Majority of the students preferred morning time (8.30am) for lecture and afternoon time (1.30pm) for demonstration and preferred duration for lecture was 1hr and for demonstration 1½hr. Two consecutive lectures and one demonstration were preferred by majority students. The analysis of the percentage of students who have opined about their preference for teaching aids for lecture and demonstration viz., chalk and board, LCD ppt is similar to study done by Rokade S. A. et al. [10] and N. Sullivan et al. [4].

Majority students have stated that they can concentrate for 30min in a lecture and 1hr for demonstration. Maximum emphasis was given to understand the topic rather than taking notes and fulfilling the attendance criteria for attending lecture/demonstration.

Further majority of the students preferred afternoon time (1.30pm) and preferred 2hr duration for dissection and guidance during dissection.

Conclusion

This study provides evidence that small group teaching is a more effective method of teaching. The small group teaching as a learning tool was appreciated by students and is responsible for self-reported satisfaction, engagement and motivation towards the subject. Even though students have shown preference to small group teaching viz., demonstration and teaching on dissection table, lectures being an efficient means of transferring knowledge and concepts to large group, require to be an integral part of the medical curriculum.

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Original Article

Indian Journal of Anatomy
Volume 7 Number 4, July - August 2018
DOI: http://dx.doi.org/10.21088/ija.2320.0022.7418.9

Placental Villous Volume at Different Stages of Gestation

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Abstract

Introduction: Placenta makes connection between mother and foetus through umbilical cord. A healthy placenta is single most important factor producing healthy baby. Main mass of placenta is formed by villous and intervillous spaces. Volume of villi gradually increases with advancement of pregnancy. *Aim and objective:* The purpose of study was to correlate fetal birth weight with villous volume. *Material and Methods:* Twenty two placentae were obtained. Volume of placentae was obtained by fluid displacement method. Histological examination was done after staining with haemotoxylin & eosin, Van Gieson and Masson's trichrome method. Size of villi was obtained by Micrometry technique and percentage of villous volume was obtained by Point Counting technique. *Result and Conclusion:* Volume of villi in second trimester and third trimester placentae was 70ml and 317ml respectively. The present study provided data of placental villous volume/fetal weight is better indicator of fetal well being than conventionally used placental/fetal weight ratio. Pathologist can use provided data for comparison of villous volume with diabetic and hypertensive mother.

Keywords: Placenta; Villi; Villous Volume; Placental Weight.

Introduction

Villi are the functional unit of placenta. Its average size at term is 35-40mm. Maternal blood enters the placenta and continuously baths the surface of chorionic villi. Each terminal villus has 1. central stroma 2. basement membrane 3. cytotrophoblast and 4. syncytiotrophoblast from central core to outer layer. Central stroma contains foetal capillaries, mesenchymal cells, small and large reticular cells, fibroblasts and Hofbauer cells. Volume of villous tissue gradually increases with advancement of pregnancy due to continuous branching of villous tree that progressively fills up intervillous space [1]. Until the end of 16th week the placenta grows both in thickness and circumference but after that there is little increase in thickness. Placenta increases circumferentially till term. Adverse pregnancy outcomes are associated with either placental growth restriction or placental hypertrophy [2].

Placental weight is frequently used in assessment of fetal well being. Apart from villous and intervillous space, placenta contains other structures like chorionic plate, amnion and part of umbilical cord etc.). Since it is the villous volume that is mainly responsible for fetal growth, the present study provides data for villous volume at different stages of gestation [3].

Material and Methods

The present study was done in a Govt Medical College. Study material included placentae from normal deliveries and cesarean sections. Mothers of the age group 20-35 years and gestational age ranging from 12-40 weeks were included. Study sample included 22 specimens. Exclusion criteria was mother suffering from Diabetes Mellitus, Hypertension and any disease affecting growth/ development of placenta. Placentae were divided into two groups i.e second and third trimester. Placentae of second trimester were obtained from patients with spontaneous/accidental abortion.

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Received | 17.07.2018, **Accepted** | 28.07.2018

Placentae of third trimester were obtained after normal vaginal delivery/caesarian section. Informed and written consent was taken.

Morphological examination was carried out and characters like weight, volume, size, shape, diameter, site of attachment of umbilical cord, cotyledon structure etc from each specimen of second and third trimester were noted. Volume of placenta was obtained by fluid displacement method and surface area of placenta was measured by following formula:

Surface area = p x L x B

L = Radius of placenta along the length.

B = Radius of placenta along the breadth.

The data obtained was tabulated in different groups. The mean average value along with standard deviation and error was calculated for each parameter. Different parameters were correlated statistically using 't' test.

Specimen was taken from maternal surface of placenta after removal of deciduas and specimen were fixed in 10 percent formal saline solution for 48 hours. Histological examination was done after staining with haemotoxylin & eosin (Harris's alum haematoxylin), Van Gieson and Masson's trichrome method.

Slides were studied under light microscope. Size of villous diameter was measured with the help of micrometer eye piece.

Relative component of villous and intervillous space were calculated by a modified point counting technique, as described by Mathur[4]. When a composite organ is examined with a grid, the relative volumes of the components are equivalent numerically to their relative areas on cut surface. A grid was prepared by drawing 25 points at equal distance on a white sheet (Fig.1). Image of slide was projected on the white sheet marked with grid. This was made possible by attaching a mirror to the monocular eye piece of microscope. Points on grid were used as counting unit. If a point lay on a measured component, it was counted as a hit for that component. 20 different fields were examined in each section, and in all, a minimum of 500 points were counted in each slide. The proportion of grid points falling on the image of the placenta components indicates the proportion volume of that component. Proportion of villous and intervillous space was determined (Fig.2). The observations were computed and analysed statistically.

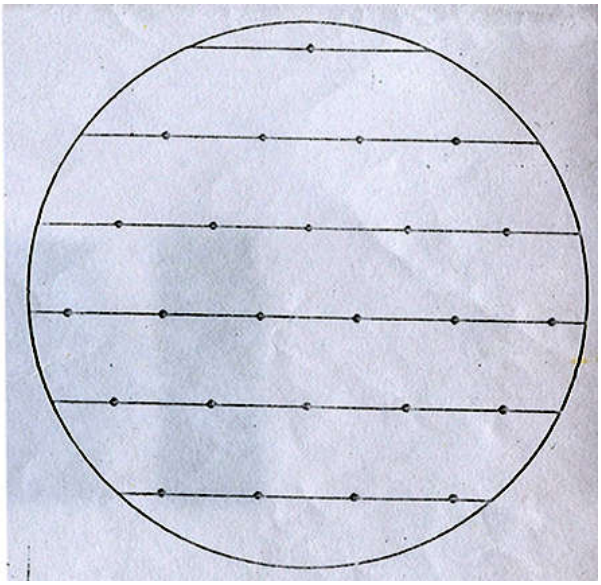

Fig. 1: Grid for Point counting

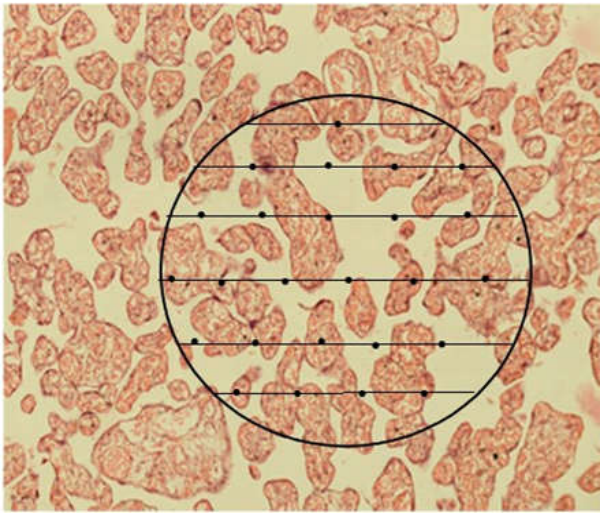

Fig. 2: Grid used to determine percentage of villous component as by Mathur technique

Result

Cases of second trimester were between ages of 20-28 years with mean age of 24 years. Mean length of umbilical cord was 16.63 ± 8.22 and range was 5-37 cm. The mean diameter of umbilical cord was 2.69±0.58 cm and range was 1.2-3.3 cm. Out of 11 specimens, 9 had eccentric attachment and 2 had central of umbilical cord attachment to the placenta. Ten placentae from the third trimester were studied, as in one case umbilical cord was not available for study. The mean length of umbilical cord was 35.6 cm and range was 19-50 cm. The mean diameter of umbilical cord was 3.37±0.86 cm with range between 2.3-5.0 cm. Out of 10

specimens, 7 had eccentric attachment and 2 had central attachment to the placenta and 1 had marginal attachment.

The average length of umbilical cord was 16.63 in 2nd trimester which increased to 35.60 cm in third trimester. Similarly diameter also increased from 2.69 cm in 2nd trimester to 3.37 in 3rd trimester.

The mean weight of placenta in second trimester was 171.36±75.73 grams with range between 20-250 grams. The mean foetal weight was 400.45±262.50 grams with range between 50-925 grams. The mean placenta/foetal weight ratio was 0.48±0.18 with range between 0.24-0.76 .

The mean weight of placenta in third trimester was 570.45±76.50 grams with range between 425-700 grams. The mean foetal weight was 2686.36±670.10 grams with range between 1600-3800 grams. The mean placenta/foetal weight ratio was 0.21±0.03 with range between 0.16- 0.28.

In second trimester the mean surface area was 64.0 cm^2, it increased to 184.7 cm^2 in third trimester. As the gestation period increased, the placental as well as foetal weight showed an increased trend. However, the ratio between placental and foetal weight was not constant; the values decreased from 0.48 to 0.21. It is apparent that after 22nd weeks of gestation, the increase in foetal weight was more than placental weight.

The number of villi seen per field increased constantly with increasing age of gestation. Concurrently the intervillous space decreased with increasing period of gestation. The comparison between each trimester was best seen at 50X and 100X magnification, as only few villi were seen at 400X magnifications.

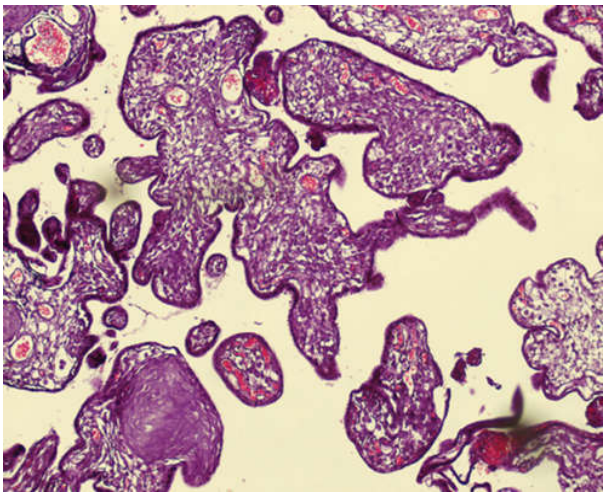

Fig. 3: Section of placenta at 20^{+3} weeks. Masson's trichrome X 100

Parenchyma of the placenta consists of villous and intervillous space. Villous volume can be further divided into trophoblast in the outer layer and stroma in the centre. All the sections of placentae were analysed for percentage volume of villous and intervillous space by modified point counting technique. Minimum of 500 points were counted in each section. In second trimester percentage of volume occupied by the villi was 56.72% (Fig.3). Volume occupied by intervillous space was 43.28% (Fig.4,5). In third trimester volume occupied by villous space was 69.10% and 30.90% by intervillous space. (Tables 1,2).

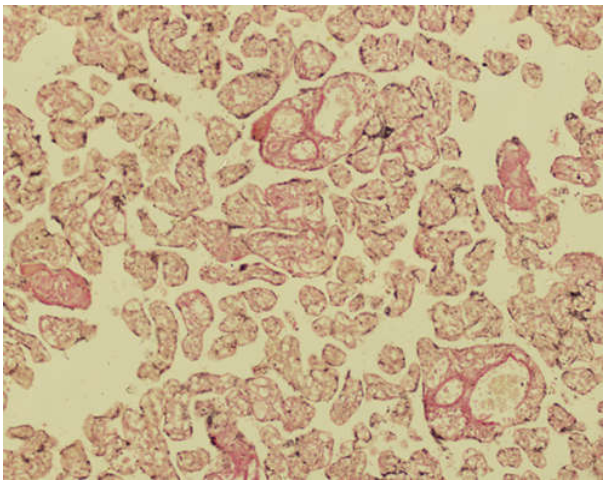

Fig. 4: Section of placenta at 39^{+2} weeks showing increase in villous volume. Van Gieson X 100

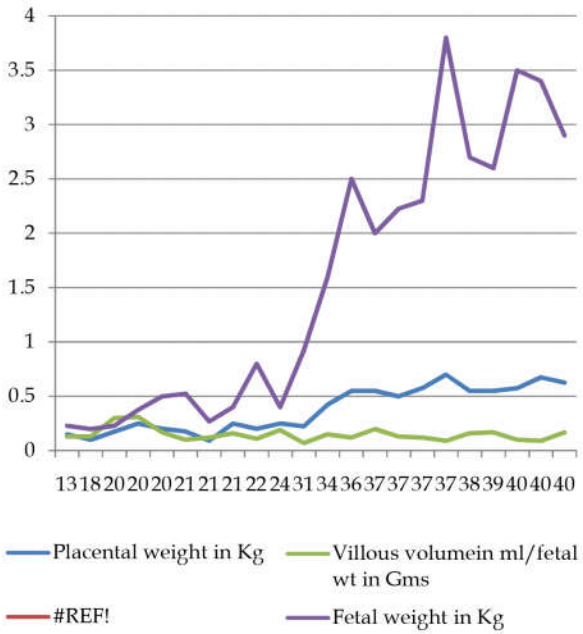

Fig. 5: A graph showing relative changes of parameters with advancement of gestation. X axis showing period of gestation in weeks and Y axis values

Table 1: Mean measurements of placenta in second and third trimester

Trimester	Second trimester		Third trimester	
	Mean± S.D	Range	Mean± S.D	Range
Period of gestation (in weeks)	20.64± 2.73	13.8-24.0	37.43±2.63	31.80-40.14
Placenta weight (in grams)	171.36±75.73	20-250	570.45±76.50	425-700
Foetal weight (in grams)	400.45±262.50	50-925	2686.36±670.10	1600-3800
Placental/foetal weight ratio	0.48± 0.18	0.24-0.76	0.21± 0.03	0.16-0.28
Surface area (in cm^2)	64.00±18.2	29-98	184.70±27	160-227
Placental volume (in ml)	123±10	82-210	460±35	320-528

Table 2: Mean volume of villous and intervillous space

Parameters	Second Trimester (n=11)		Third Trimester (n=11)	
	Mean ± S.D.	Range	Mean±S.D.	Range
Size of villi in microns	95.80 ±36.61	41-180	47.4±13.12	31-70
Percentage of villous tissue	56.72± 9.49	42.60-68-60	69.10± 13.23	51.20-84.80
Percentage of intervillous space	43.28± 8.42	31.40-57.40	30.90±13.32	15.20-48.80
Placental volume (in ml)	123±10	82-210	460±35	320-528
Villous volume (in ml)	70.01±15.42	16-116	317.76±21.71	210-360
Placental volume/foetal weight ratio	0.21±0.8	0.17-0.31	0.12±0.2	0.09-0.20

Discussion

The mean weight of placentae in second trimester (171.36 grams) in present study was less than that described by Hirano (266.8 grams)[5]. The mean weight in third trimester (570.45 grams) was more than that described by Beck (505 grams)[6], Hirano (524.8 grams) and Rath (438 grams)[7]. The placental weight in present study was taken from fresh specimen without removal of umbilical cord and blood clots, while Rath had taken the weight after removal of umbilical cord and blood clots.

The mean placental/foetal weight ratios in second and third trimester were 0.48 and 0.21. The present finding at third trimester is similar to Kalra (0.20)[8] but more than that described by Beck (0.14) and Rath (0.16). Surface area of placenta increased from 44 cm^2 to 240 cm^2 from 38^{th} day to 281^{st} day of POG. The present finding at third trimester (240 cm^2) is less than that described by Rath (254.63 cm^2).

With increase in period of gestation an increase in placental weight, placental surface area and foetal weight was seen. The rate of placental growth was maximum between 24 to 34 weeks of gestation; whereas the growth of foetus was maximum between 32 weeks to 34 weeks. The present finding is similar to Jackson, who had described maximum placental growth at 29 weeks and maximum foetal weight at 33 weeks. On comparison with third trimester, the foetal/placental weight ratio was much more in second trimester. It indicates that in early gestation main contribution to foetal-placental unit is by the placenta. In the present study the contribution of placenta to the foeto-placental unit was maximum at 20^{th} weeks (76%). Contribution of placenta to foeto-placental unit was lowest at 40^{th} weeks (16%).

In third trimester the mean diameter of villi decreased from 95.8mm to 47.4mm. In a similar study Jackson [9] had described the decrease in villous size from 90mm to 58mm from 10 weeks to term period. In third trimester, volumes of villous and intervillous space (69.10 and 30.90%) were similar to that reported by Mathur (60 and 40 %) and Teasdale (61.7 and 38.3 %).

Conclusion

With advancement of pregnancy, fetal growth rate increases far more in later part of trimester than placental growth. However placenta grows in villous volume rather than its size. Ratio between villous volume and fetal weight is maintained throughout the pregnancy; hence, it is better indicator of fetal well being. Inspite of normal weight of placenta, IUGR can occur with decrease in villous volume. Available data of normal cases can be helpful for pathologist in comparing the data with cases of hypertension, diabetes and IUGR.

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Original Article

Indian Journal of Anatomy
Volume 7 Number 4, July - August 2018
DOI: http://dx.doi.org/10.21088/ija.2320.0022.7418.10

Dermatoglyphic Analysis in Indian Subjects with Manic Depressive Psychosis: A Prospective Study

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Abstract

Introduction: Dermatoglyphics is the study of the epidermal ridges of the skin covering the digits, palms of the hands, and soles of the feet. Dermatoglyphic patterns may be viewed as "fossils" of late first and second trimester fetal development. Any disturbances in hereditary or environmental factors at the time of ridge formation may alter the dermatoglyphic pattern. It is well known that bipolal' mood disorder have some genetic predisposition. *Material & Methods:* The material for the study was clinically diagnosed cases of manic depressive psychosis (100) as per DSM-IV criteria in the age group of 15 – 70 years. Patients were those attending out patient and in patient department of psychiatry at B.M. Patil Medical College, Hospital and Research Centre, Bijapur. Finger and palm prints of 100 normal people for control of same age group were obtained from Medical students. *Results:* Increased incidence of whorls, decreased incidence of arches, ulnar loops and radial loops in MDP patients as compared with controls. Mean AFRC in MDP was lower & difference was statistically not significant. Mean TFRC in MDP was lower, difference was statistically significant (p=0.04). Mean ab-RC on right hand in MDP was lower & difference was statistically highly significant. (p=0.000). The Mean ab-RC on left hand in MDP was lower & difference was statistically highly significant (p=0.000). Mean atd angle on right hand in MDP was higher, difference was statistically highly significant (p=0.00**)**. Mean atd angle on left hand in MDP was higher & difference was statistically highly significant (p=0.000). *Conclusions:* In the present study the observed changes suggest significant difference in dermatoglyphic patterns in bipolar mood disorder and control. Our findings match with most of the previous studies in bipolar mood disorder. Dermatoglyphics, a non-invasive method, could serve as a screening indicator for the follow up of individuals in threatened families**.**

Keywords: Dermatoglyphics; Manic Depressive Psychosis; Finger and Palm Prints; The Quantitative Study Includes Total Finger Ridge Count (TFRC); Absolute Finger Ridge Count (AFRC); 'ATD' Angle.

Introduction

Cummins in 1926 for the first time coined the term dermatoglyphics to this field of science. It has been accepted and adopted internationally. Etymologically this term is harmonious blend of two words Derma, Skin; Glyphe, Carve. It gives the impression that something has been carved out of the skin [1].

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Received | 18.05.2018, **Accepted** | 09.06.2018

Dermatoglyphics is the study of the epidermal ridges of the skin covering the digits, palms of the hands, and soles of the feet. Epidermal ridges are formed between the 11th and 24th weeks of gestation; after this time, the epidermal ridges do not change and hence have been considered as markers of prenatal brain injury [2].

Dermatoglyphic patterns may be viewed as "fossils" of late first and second trimester fetal development. Any disturbances in hereditary or environmental factors at the time of ridge formation may alter the dermatoglyphic pattern. It is well known that bipolal' mood disorder have some genetic prcdisposition [3]. There has been reports of associations between dermatoglyphic patterns and bipolar mood disorders [4,5].

Hence, this study was undertaken to explore the differences between bipolar and normal individuals on the basis of dermatoglyphic parameters.

Material and Methods

Finger Prints

The distal phalanges of person's right hand were inked over the tile by firm pressure on the dorsum, starting from little finger. The distal phalanges of left hand were similarly inked.

White crystal bond paper, applied firmly over a wooden pad, was used for recording the inked epidermal ridge patterns. Rolled finger prints were recorded after applying uniform pressure on white bond paper as following order [ulnar to radial side].

Palm Print

Palm prints of both hands were obtained after inking them with help of rubber roller. A white crystal bond paper was wrapped around a wooden pad placed on the table.

The prints obtained were immediately examined with hand-lens and care was taken to include all essential details.

Source of Data

The material for the study was clinically diagnosed cases of manic depressive psychosis (100) as per DSM-IV criteria in the age group of 15 – 70 years. Patients were those attending out patient and in patient department of psychiatry at. B. M. Patil Medical College, Hospital and Research Centre, Bijapur. Finger and palm prints of 100 normal people for control of same age group were obtained from Medical students of BLDEU'S Shri B.M. PATIL Medical college, Hospital and Research Centre, Bijapur.

All the data was analyzed qualitatively and quantitatively. Findings of each case were recorded in separate forms.

Study period: Study was carried out for a period of 1.5 years from Nov 2010 to April 2012.

Inclusion Criteria

Manic Depressive Psychosis as per criteria lay down by Diagnostic and Statistical Manual of Mental Disorders, published by American Psychiatric Association (DSM-IV criteria) [6].

Exclusion Criteria

Infected hand. Deep burns of fingers and palms leading to scars. Any deformities of fingers and palm.

Type of Study

The qualitative study includes finger print patterns (whorls, radial loops, ulnar loops and arches) and palmar pattern (ab ridge count, interdigital patterns).

The quantitative study includes total finger ridge count (TFRC), absolute finger ridge count (AFRC), and mean 'atd' angle.

Statistical analysis for quantitative analysis, the arithmetic mean and standard deviation were calculated. For qualitative analysis, the 'Chi' square test was applied wherever necessary [7].

To analyze finger pattern frequency, the fingertip pattern configurations were classified as arches (A), loops (L), whorls (W). The arches were further recorded as simple (A), or tented (A^t) arches depending upon the presence or absence of a triradius. For statistical purpose, both were grouped together as arches only. Loops (L) were recorded as ulnar or radial depending upon the side on which it opened. p' value is probability rate at 0.05 level of significance for the corresponding degree of freedom. $p<0.05$ is significant. $p>0.05$ is not-significant.

Results

The described table 1 shows- increased incidence of whorls (39.1% vs. 37.6%), ulnar loops (56.1% vs. 55.8%), arches (4.2 % vs. 5%) and radial loops (0.5% vs. 1.6%) in MDP males as compared with control males. The difference was statistically non-significant (p= 0.31).

The table 2 shows- increased incidence of whorls (37.7% vs. 32.6%), decreased incidence of arches (4.9% vs. 7%), ulnar loops (56.3% vs. 5883%) and radial loops (1.2% vs. 1.6%) in MDP females (Right & left hand combined) as compared with control females. The difference was statistically non-significant (p= 0.26).

The table 3 reveals - increased incidence of whorls (38.5% vs. 35.1%), decreased incidence of arches (4.5% vs. 6%), ulnar loops (56.2% vs. 57.3%) and radial loops (0.8% vs. 1.6%) in MDP patients as compared with controls. It can also be appreciated that the difference was statistically non significant (p= 0.09).

The described table 4 shows that the Mean AFRC in MDP was lower (142.9) with S.D. of 51.8 as compared to control group & difference was statistically not Significant. (p=0.174).

Table 1: Comparison of Fingerprint Patterns in Male MDP Patients & Controls

Male- Right + Left	W		LU		LR		A		Statistics
	No	%	No	%	No	%	No	%	
MDP	223	39.1	320	56.1	3	0.5	24	4.2	X^2= 3.516 D.F= 3 P= 0.319
Controls	188	37.6	279	55.8	8	1.6	25	5	

Table 2: Comparison of Fingerprint Patterns in Female MDP Patients & Controls

Female- Right + Left	W		LU		LR		A		Statistics
	No	%	No	%	No	%	No	%	
MDP	162	37.7	242	56.3	5	1.2	21	4.9	X^2= 3.994 D.F= 3
Controls	163	32.6	294	58.8	8	1.6	35	7	P= 0.262

Table 3: Comparison of Fingerprint Patterns of MDP Patients & Controls

Patterns	MDP (Male+Female)	Controls (Male+Female))	χ^2	P
W	385 (38.5 %)	351 (35.1 %)	6.49,d(f)=3	P= 0.09
L U	562 (56.2 %)	573 (57.3%)		
L R	8 (0.8%)	16 (1.6%)		
A	45 (4.5 %)	60 (6 %)		

Table 4: Comparison of Quantitative Dermatoglyphic Features Of MDP & Controls

Features	Group (N=100)	Mean	Std. Deviation	t- value	Sig. (2-tailed)
AFRC	MDP	142.92	51.890	-1.365	.174
	Controls	154.75	69.381		
TFRC	MDP	108.15	23.614	-2.070	.040
	Controls	117.18	35.692		
R-abRC	MDP	26.27	4.178	-12.572	.000
	Controls	35.72	6.249		
L-abRC	MDP	26.38	3.481	-13.771	.000
	Controls	35.94	5.976		
R-atd	MDP	42.08	5.237	4.065	.000
	Controls	39.11	5.095		
L-atd	MDP	42.62	5.5	4.102	.000
	Controls	39.50	5.252		

Mean TFRC in MDP was lower (108.15) with S.D. of 23.6 as compared to control group , difference was statistically significant. (p=0.04). Mean ab-RC on right hand in MDP was lower (26.2) with S.D. of 4.1 as compared to control group & difference was statistically highly significant. (p=0.000). The Mean ab-RC on left hand in MDP was lower (26.38) with S.D. of 3.4 as compared to control group & difference was statistically highly significant. (p=0.000).

Mean atd angle on right hand in MDP was higher (42.08) with S.D. of 5.2 as compared to control group, difference was statistically highly significant. (p=0.000). Mean atd angle on left hand in MDP was higher (42.62) with S.D. of 5.5 as compared to control group & difference was statistically highly significant. (p=0.000).

The described Table 5 shows frequency of interdigital patterns in MDP and controls, it can be noted that in MDP highest number of patterns were seen I4 and I3 areas (39% & 31%) and in controls also same that was I4 & I3 (37% & 33%). Statistically significant difference was found in I2 area (p=0.002) and I4 area (p=0.049).

Table 5: Comparison of Frequency of Patterns in Interdigital Areas, Hypothenar Areas in MDP Patients and Controls

Interdigital Pattern	MDP NO (%)	Controls NO (%)	X^2	Degree of Freedom	P value
TH /I1	0 (0)	1 (0.5)	1.005	1	.316
I2	9 (4.5)	0 (0)	9.424	1	.002
I3	63 (31.5)	74 (37)	2.804	1	.094
I4	78 (39)	66 (33)	3.571	1	.049
HYT	20 (10)	17 (8.7)	.298	1	.585

Discussion

Balgir et al. [8] studied dermatoglyphics in MDP and according to the study – in fingerprint patterns of MDP patients there were more loops (50.3%), whorls next in frequency (47.3) and least was arches (2.3%), when compared with control group (loops- 51.3%, whorls-45.4% and arches 3%). These findings are similar to findings in our study (Table 3). In the same study [8] Regarding interdigital area pattern, there was no significant difference in the occurrence of patterns in I3 and I4 interdigital areas in both the MDP male (I3=59% & I4=57%) and MDP female (I3= 72% & I4=64.4%) patients as compared with controls (I3=47% & I4=52%). The data was statistically not significant. This study is similar to observations in present study except in present study the data is statistically significant I2 & I4 areas (Table 5).

Balgir RS et al. [9] studied dermatoglyphics in MDP, in his study the frequencies of fingerprint patterns was as follows- in male MDP patients— loops– 50.3%, whorls-47.3%, and Arches-2.3%, in female MDP patients— loops– 56.8%, whorls-39.6%, and Arches-3.5%. This pattern is similar to our findings in the present study (Table 1 & 2).With respect to patterns in interdigital areas in MDP cases- Thenar/ I1=15%, I2=14%, I3=76.6%, I4=66.6%, and Hypothenar= 38.3% as compared with male control group- Thenar/ I-1=3%, I-2=6%, I-3- 36.6%, I-4- 45.8%, and Hypothenar- 21.6%. Data was statistically significant at all interdigital areas. The results of this study are nearly similar to results of present study (Table-5). Mean TFRC of MDP was 141.6 (s,d=42.3), as compared with control group of 141.3 (s,d=40.78).This comparison was statistically non-significant. This finding was also similar to present study (Table-4), except that the result of present study was statistically significant. Mean atd angle of MDP was low, as compared with control. This comparison was statistically significant ($p< 0.001$). This observation is similar to present study (Table 4).

Yousefi-Nooraie R et al. [10] in his research found that- mean TFRC of MDP was (87.6) and control (74.9). The data was statistically not significant (P=0.09). Contrary to this stud,y in present study the mean TFRC in MDP group is lower than in controls (Table 4), but this difference was statistically significant. In the same study [62] the mean Right ab-ridge count in MDP (40.3) and control (40.1). The data was statistically not significant (p=0.6). Similar to this study in present study the mean Right ab-ridge count in MDP group was lower as compared control to and the difference was statistically highly significant (Table 4).

In the same above mentioned study [10] the mean of right atd angle in Bipolar sample, and Control sample was- 44 (s.d=8.3) and 42.9 (s.d=7.5) respectively. The data was statistically not significant (p=0.3). In present study the mean Right atd-angle in MDP group was higher than control (Table 4), and this difference statistically significant. Mean left atd angle in Bipolar sample, and Control sample was- 43.8 (s.d=7.6) and 42.7 (s.d=8.2) respectively. The data was statistically not significant (p=0.1). similar to this in present study the mean left atd-angle in MDP group was higher than control (Table 4), difference being statistically significant.

Chakraborty D et al. [5] studied Dermatoglyphic in Malay Subjects with Bipolar Mood Disorder, according to his study when Finger Print Frequencies in Both Hands of male MDP patients are compared with controls - in male MDP whorls were 41.22%, ulnar loops were 50.40%, radial loops were 7.5% and arches were 0.8% as compared with control group -whorls 43.33%, ulnar loops w ere 53.66, radial loops were 2.5% and arches were 0.5%. The difference was statistically not significant. Findings in the above described study are consistent with observations in the present study (Table 1) except for arches which were found to be increased in present study.

Chakraborty D et al. [5] also studied Finger Print Frequencies in Both Hands of Malays Both Sexes combined , according to his study- in MDP group the percentage of whorls was- 42% , ulnar loops were -49.6% , radial loops were 7.46% and arches- 0.93% as compared with controls (whorls 41.17%,ulnar loops- 55.88%, radial loops 2.45% and arches-0.49%). Results of the above described study are consistent with observations in the present study (Table 3) except for arches which were found to be increased in present study. In his study atd angle was found to be increased in MDP patients as compared with controls (81.15 vs 79.27). The difference was statistically not significant. This finding is also consistent with present study (Table 4).

Jelovac N et al. [11] studied dermatoglyphics in MDPand control groups and according to his study- mean TFRC in MDP was lower than control groups (116.86 & 141.03). The difference was statistically significant .This finding is similar to finding in present study (Table 4). Mean Right ab-RC in MDP and control groups was - 35.3 and 41.8 respectively. The difference was statistically significant (p=0.001). Mean left ab-RC in MDP, and control groups was - 37.04 and 43.5 respectively. The difference was statistically significant (p=0.001). These two observations go hand in hand with

observations in present study (Table 4). Mean atd angle in right hand of MDP and control groups was - 42.06 and 47.42 respectively. The difference was statistically significant (p=0.001). Mean atd angle in left hand of MDP and control groups was - 41.61and 47.86 respectively. The difference was statistically significant (p=0.001). This finding was also similar to finding in present study (Table 4).

Conclusions

In the present study the observed changes suggest significant difference in dermatoglyphic patterns in bipolar mood disorder and control. Our findings match with most of the previous studies in bipolar mood disorder. Dermatoglyphics, a non-invasive method, could serve as a screening indicator for the follow up of individuals in threatened families**.**

Prominent Conclusions from Present Study Include

In fingerprint pattern of MDP as compared with control - there were more loops, whorls next in frequency and least was arches. Frequency of occurrence of pattern in interdigital areas, there were more patterns seen in I3 & I4 areas, but data was statistically significant only at I2 and I4 areas. Mean atd angle in MDP was high, this was statistically significant. Mean TFRC in MDP group was law, difference statistically significant. Mean Right & Left ab-ridge count in MDP group was lower; this difference was statistically highly significant. Mean Right & left atd-angle in MDP group was higher, and difference was statistically significant. Mean right and left ab-RC in MDP was high and difference was statistically significant.

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Original Article

Indian Journal of Anatomy
Volume 7 Number 4, July - August 2018
DOI: http://dx.doi.org/10.21088/ija.2320.0022.7418.11

Sonographic Measurement of Spleen in Relation to Age: A Prospective Study in Adult Gujarati Population

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Abstract

The objective of the study is to assess the variation in splenic measurement like length, width and thickness in normal persons and categorise them according to different age group and sex using ultrasonography. This study was done on 500 individuals aged between 21-60 years. Ultrasonographic measurement of spleen was done by ESAOTE MYLAB 40 Machine. Measurement of spleen was taken by using convex 2.5-6.6 MHz probe. It was observed that the length decreased slowly with increase in age in both sexes. The width in male first it decrease then slightly increase and after that it again decreases. In female width slightly increases up to the age of 40 years, after 40 years of age it decreases slowly up to the age of 60. The thickness in male first decrease then slightly increases and after again decreases. In female first the thickness increases slowly after that it remains relatively constant, then decreases. All dimensions of spleen were greater in males that in females.

Keywords: Spleen; Ultrasonography; Hilum; Coronal Plane.

Introduction

The spleen is a reticuloendothelial and lymphoid organ and sometimes works as hemopoietic organ. Otherwise this organ is graveyard of RBCs [2] situated in the upper left quadrant of the abdominal cavity between the fundus of stomach and diaphragm. Its shape varies from a slightly curved wedge to a 'domed' tetrahedron. The size and weight of the spleen vary with age and sex. It can also vary slightly in the same individual under different conditions. In the adult it is usually 12 cm long, 7 cm broad, and 3–4 cm wide. It is comparatively large in children, and although its weight increases during puberty [1].

The size of spleen is affected in various clinical conditions, most often due to reactive proliferation of lymphocyte or reticuloendothelial cell. Splenomegaly is also caused by septicemia, malaria, kala-azar, CCF, cirrhosis, sarcoidosis, leukemias, lymphoma, Gaucher's disease, metastasis, secondaries, arsenic and phosphorus poisoning [2].

Many imaging techniques can be used to determine the size of spleen; ultrasonography is particularly useful because of the ease of use and lack of radiation exposure. Diagnostic imaging to assess spleen size is routinely accomplished by Ultrasonographic measurement along its long axis. However, there are variations among the radiological texts in defining the upper limits of normal for longitudinal diameter, with values ranging from 12 to 14 cm in adults. Normal spleen size has been found to vary significantly depending on age and sex [6].

We measured the splenic length, breadth and thickness in different age group and sex of adult population of Gujarat region of India and compared these measurements with those found in other reports.

Materials & Methods

The present study is cross-sectional in nature and conducted in Government Medical College and Sir T. Hospital, Bhavnagar, Gujarat.

Before starting the study, prior permission of Professor and Head of Department, Anatomy and

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Received | 09.06.2018, **Accepted |** 22.06.2018

Department of Radiology faculties was taken. Present study protocol was approved from the institutional review board [IRB (HEC) No.403/2014].

A prospective study will be conducted on 500 individuals aged between 21-60 years. Previous studies - as mentioned in references - have taken sample size of 160, but for more precise results, this study will be conducted on 500 individuals.

1. USG will be done by using Esaote My Lab 40 Machine.
2. Measurement of spleen will be taken by using convex 2.5- 6.6 MHz probe.
3. Individual will be positioned on coach in supine and right lateral position for examination with deep inspiration. Any USG scan suggestive of Splenomegaly was excluded.
4. Spleen will be measured at three dimensions (length, width and thickness).

   Length: On longitudinal coronal image from dome to tip through hilum.

   Width: On transverse coronal plane at hilum

   Thickness: Longitunal coronal plane at point bisecting the line indicating the length.
5. Following Splenic measurement were taken on USG scan:
   - Sonographic measurement of Splenic Length. (Fig. 1)
   - Sonographic measurement of Splenic Width.(Fig. 2)
   - Sonographic measurement of Splenic Thickness.(Fig. 3)

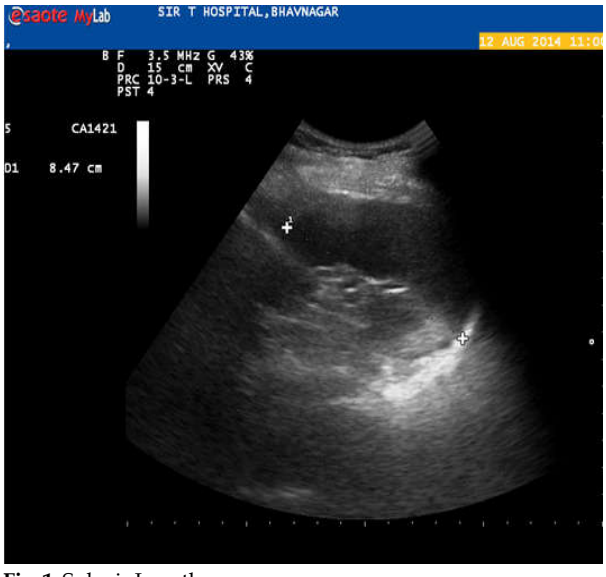


Fig. 1: Splenic Length

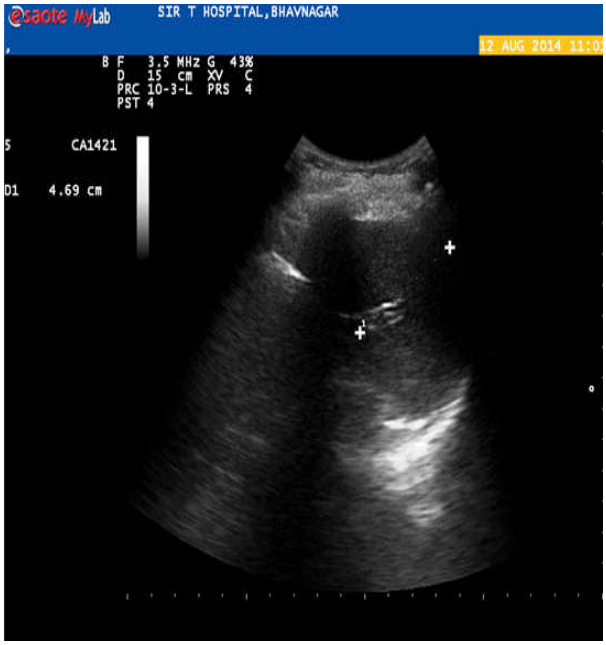


Fig. 2: Splenic width

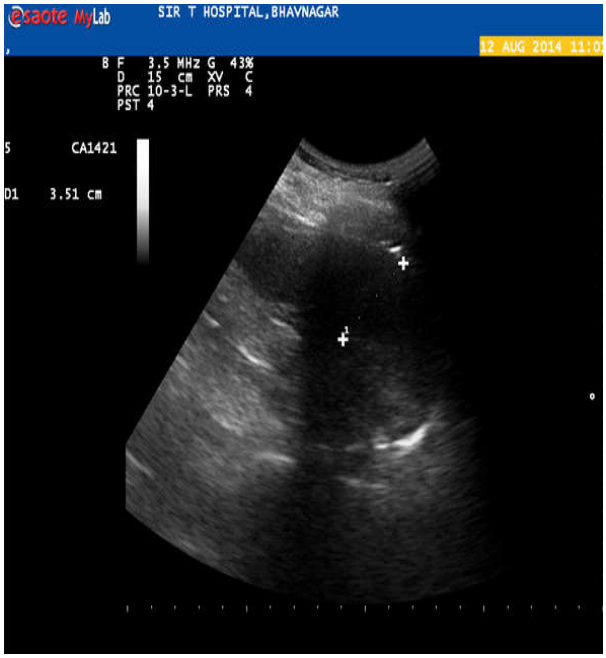


Fig. 3: Splenic thickness

Observations

500 USG Scans were studied and analyzed for Spleen measurement. There were 250 males (50%) and 250 females (50%) with age range of 21-60 years in Govt. Medical College & Sir T. Hospital Bhavnagar.

The statistical data which were extracted from the calculation and analysis are tabulated in Table-1 to Table-6 to show different parameters at a glance.

Table 1: Splenic length in different age groups in Male

Age	N	Mean(cm) ± SD	Range (cm)	Correlation coefficient
21-30	70	10.08429± 0.983485	7.92– 11.90	r = 0.2522
31-40	57	9.997895 ± 1.018861	7.56 – 11.83	r^2 =0.06360
41-50	62	9.938871± 0.739633	7.97 – 11.9	P value<0.0001
51-60	61	9.482787± 1.212961	6.59 – 11.54	

Table 2: Splenic length in different age groups in Female

Age	N	Mean(cm) ± SD	Range (cm)	Correlation coefficient
21-30	102	9.380392 ± 1.125987	6.83–11.84	r = – 0.04181
31-40	75	9.574667 ± 0.986129	7.2 – 11.93	r^2 = 0.001748
41-50	46	9.288043 ± 1.127803	7.17 – 11.4	P value= 0.5105
51-60	27	9.241111 ± 1.183432	7.15 – 11.59	

Table 3: Splenic Width in different age groups in Male

Age	N	Mean(cm) ± SD	Range (cm)	Correlation coefficient
21-30	70	4.575652 ± 0.712367	2.94– 6.23	r =– 0.01124
31-40	57	4.464386 ± 0.66776	3.15– 6.31	r^2= 0.01264
41-50	62	4.590161 ± 0.739633	3.08 – 6.53	P value: 0.0754
51-60	61	4.279672 ± 0.760467	2.92 – 6.07	

Table 4: Splenic Width in different age groups in Female

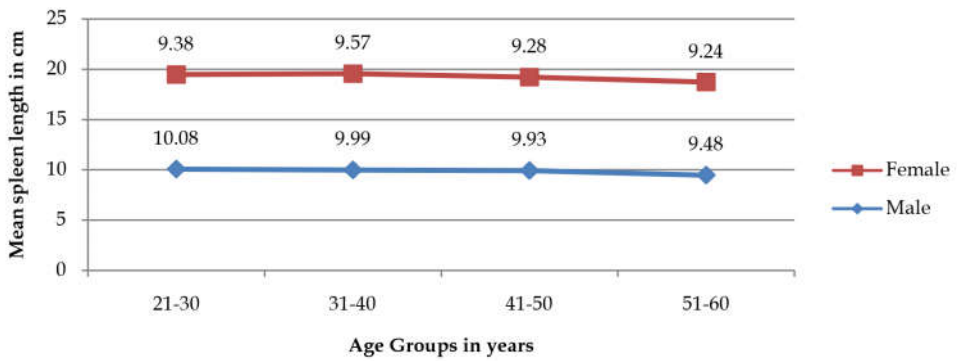
Age	N	Mean(cm) ± SD	Range (cm)	Correlation coefficient
21-30	102	4.174216 ± 0.68292	2.88–5.82	r = 0.01672
31-40	75	4.332133 ±0.785709	2.6–6.42	r^2= 0.0002795
41-50	46	4.138478 ± 1.127803	2.57– 6.61	P value 0.7921
51-60	27	4.078148 ± 0.693104	2.91 – 6.46	

Table 5: Splenic Thickness in different age groups in Male

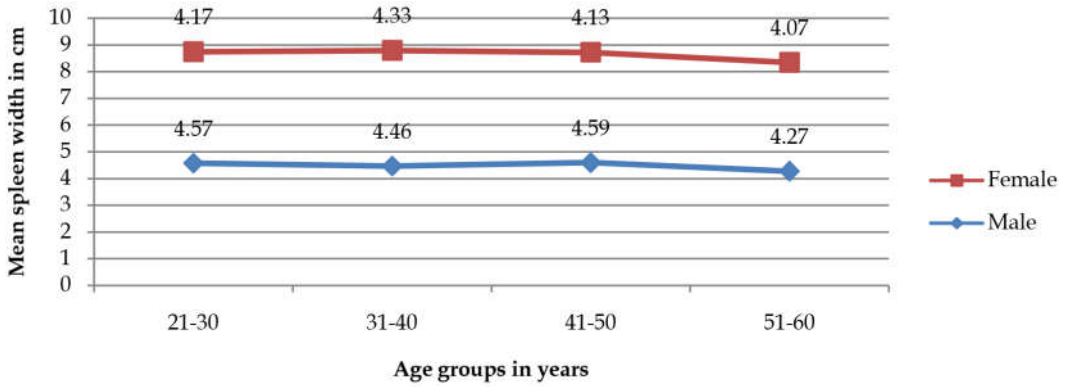
Age	N	Mean(cm) ± SD	Range (cm)	Correlation coefficient
21-30	70	3.538 ± 0.683333	2.07-5.23	r = -0.09614
31-40	57	3.425965 ± 0.616974	2.45-4.77	r^2 =0.009242
41-50	62	3.58629 ± 0.678871	2.25-5.52	P value: 0.1288
51-60	61	3.40541 ± 0.6377	2.05-5.65	

Table 6: Splenic Thickness in different age groups in Female

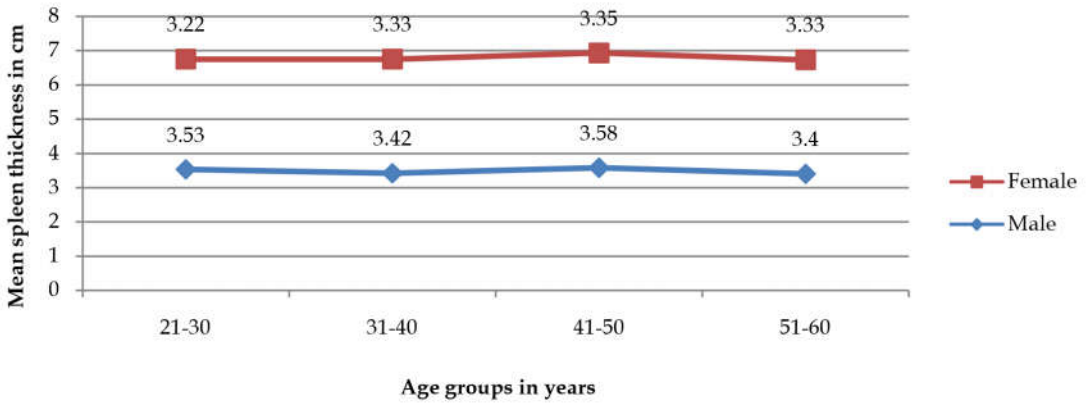
Age	N	Mean(cm) ± SD	Range (cm)	Correlation coefficient
21-30	102	3.22402 ± 0.606929	2.1– 4.65	r = -0.06648
31-40	75	3.334133 ± 0.645994	2.14 – 5.09	r^2 = 0.004420
41-50	46	3.352391 ± 0.727911	1.7– 4.63	P value: 0.2941
51-60	27	3.252963 ± 0.564527	2.2 – 4.77	



Graph 1: Change in spleen length in relation to sex



Graph 2: Changes in Spleen width in relation to sex



Graph 3: Changes inSpleen thickness in relation to sex

Discussion

The splenic size may give information about the diagnosis and course of the gastrointestinal and hematologic disease [14]. In one study the splenic size was evaluated in patients with sarcoidosis and thrombocytosis, the splenomegaly was present in 57% of the patients (using sonographic criteria to evaluate the size), but only clinically palpable in 8% of the cases.

In the present study, it was observed that the splenic length decreased with age in both males and females. The splenic length decreased at a slow rate up to the age of 60 years. This was relatively different to the findings of Loftus and Metreweli. They observed rapid growth in the splenic length up to the age of 20 years followed by a mild decrease up to the age of 50 years and then rapid fall after the age of 50 years (Graph 1).

In the present study, it was observed that the splenic length was found to be less than 11 cm in most of the subjects. This was similar to the findings of Frank et al. [10].

In the Arora et al. [4] study, they observed that splenic length decreased slowly up to the age of 50 years and after 50 years rapid fall is seen in both sex. In present study, the splenic length was decreased slowly up to the age of 60 years, this was different from Arora et al. [4] the splenic width decreases up to the age of 30 years, after 30 years it remain relatively constant up to the age 50 years and after that splenic width decreased. In present study up to the age of 40 years splenic width decrease slowly, with increase in age. After 40 years it slightly increases up to the age of 50 years, then after 50 years it decreases up to the age of 60 years (Graph 2).

Splenic thickness was constant up to the age of 50 yrs, after which there was a fall in the splenic thickness. Arora et al.[4] In our study in the males up to the age of 40 years splenic thickness decreases. After 40 years splenic thickness slowly increases up to the age of 50 years and After 50 years splenic thickness decreases. In the female up to the age of 40 years splenic thickness increases slowly after that up to the age of 50 years it remain relatively constant. From the age group 51 to 60 years splenic thickness decreases (Graph 3).

Rosenberg et al. [11] studied that the upper normal limit of the splenic length was observed to be 12 cm for girls of 15 years or more and 13 cm for boys of 15 years or older. These findings were slightly different from the findings of the present study. This difference may be due to the genetic factors, nutritional factors or the environmental factors.

In an another study the mean longitudinal diameter of the spleen was found to be 5.8±1.8 cm and transverse diameter 5.5±1.4 cm. These dimensions were much smaller than those of present study because the authors did not measure the maximum length of the spleen [14].

The splenic width and thickness were observed to be less than 6 cm and 4 cm respectively in most of the subjects In the present study. This was different from the findings of Frank K, who observed the splenic width below 7 cm and thickness below 5 cm in most of the subjects [10].

In Bihari population the length of spleen increased with increase in the height in both male and female. Splenic length was determined by ultrasonography. In our study Splenic length decreased slowly with increase in the age up to 60 years [17].

Udoaka AI, et al. [19] described that the length of spleen in ages ranging from 18 to 40 years was 9.23 ± 1.53 cm. In present study the length of spleen in this age group was 10.03±0.99cm. This difference was slightly from Udoaka. This difference may be due to the genetic factors, nutritional factors or the environmental factors.

Spielmann et al, have studied that the average length of spleen was found in athlete 11.4±1.7cm in males and 10.3± 1.3cm in females. The spleen length was greater male athlete than female [30]. In our study mean splenic length for male is 9.87± 098cm and for female 9.36±1.10cm. The length is greater in male than female but the mean value of length is lesser than the Spielmann study.

Conclusion

In the present study an attempt has been made to determine the normal range of the length, width and thickness of the spleen and to correlate these dimensions with the age in male and female subjects. The splenic length in both male & female is significantly correlate with the age while width is relatively significant in both sex and thickness is not correlate with age in either of sex. By this study we find that ultrasonography is the current procedure of choice for routine assessment of spleen size (normal = a maximum cephalocaudal diameter of 13 cm) because it has high sensitivity and specificity and is safe, noninvasive, quick, mobile, and less costly.

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Original Article

Indian Journal of Anatomy
Volume 7 Number 4, July - August 2018
DOI: http://dx.doi.org/10.21088/ija.2320.0022.7418.12

Conventional Viva in Anatomy: What Do the Indian Students and Faculty Say?

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Abstract

Background: Conventional Viva, so far is the commonest assessment tool used in practical examinations in Anatomy in India since long times. However, elaborate studies looking for how the students and faculty perceive it are lacking. The present study was undertaken to determine the perception of first year undergraduate medical students and Anatomy faculty about various aspects of the Conventional Viva. *Methods*: The feedback was collected from 586 I[st] MBBS students, immediately after they finished their preliminary practical examination, during the academic years 2013-14, 2015-16, 2016-17, using pre-validated, pre-tested structured questionnaire. Responses were sought on 5-point Likert scale. Views of 40 Anatomy faculty were also invited and data was analysed statistically. *Results*: We observed that students were satisfied with regards to the coverage of syllabus. Both, the students and faculty, were satisfied with regards to time given to answer the questions. Students reported cognizable fear for the examiners, stress, anxiety and reduced comfort during viva. Mood of examiners and personal bias by them were important drawbacks perceived by students. Significant proportion of students and faculty felt that lack of equal opportunity to all the students, 'carry over effect' and the extraneous help to students in the form of hints prevailed in the viva. Less satisfaction was reported by faculty while assessing with conventional viva. *Conclusion*: Our findings indicate that there is an urgent need to appraise the current pattern of Viva-Voce. Best feasible option in a set up like ours can be 'Monitored Viva By Sensitized And Trained Examiners'.

Keywords: Medical Education; Conventional Viva; Viva Voce; Anatomy; Student's Feedback.

Background

Viva voce ('viva') or the oral examination is an ancient method of assessment [1]. It has held an important place in medical education for centuries. Tradition aside, it is used for its flexibility, apparent fidelity, and potential for testing all three domains namely cognitive domain, psychomotor domain and & affective domain. It can test learner's attitude and professional competence. Likewise, it tests the students' ability to take quick decisions, discuss and defend and the presentation skills. It also assesses the learner's ability to perform under stress. It is a quick method of assessment where the learner expresses his ideas and views without any external help, thus the chances of unfair means are meager. Thus, if properly conducted, it can be a good assessment tool for learners.

In most of the universities in India, the practical examination in anatomy is conducted in two parts:

i. *Oral examination/ viva:* on prosected specimens, bones, histology, embryology, living anatomy & radiology;and

ii. *Spots*: of histology and / or gross anatomy.

Thus, whole of the practical examination in anatomy, except spots, is conducted in the form of oral examination or viva. While working with many examiners, it is our experience that viva here are conducted by conventional way, without any prior planning (for areas to be tested, number and types of questions to be asked and their difficulty level, marking pattern etc). Hence, unfortunately, it is prone to have many drawbacks in terms of validity (non coverage of relevant domains qualitatively and quantitatively which are supposed to), reliability (inconsistency with evaluation of each student in context to time, question content and allotment of marks) and objectivity (intimidate examiners, bias on the part

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Received | 08.06.2018, **Accepted |** 22.06.2018

of topic, difficulty level of questions & previous encounter/ interaction with the student etc). Also, mood of examiner often affects the marks allotted to the students. However, studies depicting clear picture on these issues are lacking.

With this background, the present study was undertaken to study the perception of first year undergraduate medical students and anatomy faculty about various aspects of the conventional viva in anatomy.

Material and Methods

This was a prospective cross- sectional study. The institutional ethical committee approval was obtained. The study was conducted in three academic years, i. e. 2013-14, 2015-16 and 2016-17, in the department of Anatomy in a government medical college from India. Objective structured questionnaire were prepared for the students and faculty. They were tested and validated on a small group of students and examiners respectively to see whether the questions were clear and evoked appropriate response.

In the first half of April month of all the three academic years, the preliminary examination was conducted in anatomy as per the university guidelines, the practical part of which was conducted in batches of 25 students. The examiners and 1st MBBS students were explained the purpose of the study and any doubts raised were solved. They were appealed to participate in the study and give a frank and honest response. Furthermore, to evoke frank response, double blind method was adopted. Total 586 students participated in the study voluntarily. The number of students participated in the study each year and by gender are shown in Table 1. Immediately after the student finished the practical examination, he/she was given the questionnaire to answer. All the students returned the questionnaire, resulting in 100% response rate.

Table 1: Sample Size: Yearwise

A.Y.	Males	Females	Total
2013-2014	100	94	194
2015-2016	98	97	195
2016-2017	99	98	197
Total	297	289	586

The faculty who had minimum 5 years of teaching experience after post-graduation in Anatomy, were considered eligible to participate in the study. Total 40 faculty participated in the study. These faculties were given the questionnaire at the end of the preliminary examinations. All of them returned it answered (response rate: 100%).

The questionnaire for students included total 13 statements (05 about their general perception of conventional viva, 05 about the viva they had just faced and 03 about their psychological status (e.g. stress, self reported anxiety and comfort) in the examination hall. The options provided were strongly disagree, disagree, neutral, agree , strongly agree. The number and percentage of students opting for each response were calculated. Gender specific analysis was also done. Fisher's Exact Test was applied.

The questionnaire for faculty included 8 statements to test different aspects of the viva they had conducted. In the end, opinion was sought about their comfort and satisfaction with current pattern of viva. For all these statements, responses were sought on 5-point Likert scale.

Results and Discussion

The traditional viva examination is widely used in Indian medical universities as a method for assessment of undergraduate as well as postgraduate medical students. However it is often criticized due to lack of standardization, objectivity and reliability [1]. The viva examination involves multiple examiners which may result in variation in the time allotted to each student, number of questions asked and difficulty level of the questions asked. The questions asked vary from examiner to examiner and from student to student. Some examiners may be stringent while others lenient while allotting marks. Thus subjectivity is a major cause of concern in traditional viva. Most of the questions are of recall type rather than testing the analytical and problem solving abilities of the students [2]. Besides these, the carry over effect (previous student's score affects the score of the next student) is a possibility. Many a times the atmosphere of the examination hall is threatening and the students are under a lot of stress while waiting for their turn to face the examiners. Many of them may have performance anxiety. Thus understanding the perception of students towards practical examination is imperative. However, no study from India brings out the realistic picture. The present study, to the best of our knowledge, for the first time addresses this issue and we reveal the perceptions of the examiners and students in one stance.

Table 2: Students' Perception About Conventional Viva (N= 586)

Variable	Strongly Agree 1	Agree 2	Neutral 3	Disagree 4	Strongly Disagree 5	Total Agree 1+2	Total Disagree 4+5
1. Examiners' mood affects scores	189	319	0	48	30	508 (86.7)	78(13.3)
2. Being scared of facing examiner	271	227	3	67	18	498 (85)	85 (14.5)
3. Face-to-face viva affects scores	296	181	0	97	12	477 (81.4)	109 (18.6)
4. Chances of bias may occur	103	161	27	145	150	264 (45)	295 (50.3)
5. Peer students' performance affects score	126	159	0	202	99	285 (48.6)	301 (51.4)
6. Syllabus appropriately covered	402	98	5	65	21	500 (85.3)	86 (14.7)
7. Hints given by examiner	306	93	3	169	15	399 (68.1)	184 (31.4)
8. Equal time to all students	189	222	3	109	60	411 (70.1)	169 (28.8)
9. Sufficient Time given to answer questions	468	70	0	33	12	538 (91.8)	45 (7.7)
10. Adequate Transparency during viva	444	72	6	40	12	516 (88.1)	52 (8.9)

Table 2 shows the perception of the first year undergraduate medical students towards various aspects of the conventional viva. In the table 2, statements 1 to 5 are related to the general perception of the students about the conventional viva. From the table, it is seen that 86.7% of the students felt that the mood of examiner can affect the scores allotted to them. For optimal performance of a student, it is essential that examination should be conducted in a stress free atmosphere. However, facing any examination (even theory examination), creates stress to the examinees. The stress levels of the students in the current pattern of viva is too high as observed in our study (Figure 2). Many students were scared of facing the examiners during the viva (85%), leading to additional stress. Further, more than three-fourth of the students in our study were of the opinion that the practical examination with face-to face viva have adverse effect on their performance. Personal bias by the examiner due to his prior encounter/interaction with the student or because of other external influence/s is a possibility commonly talked about in relation to traditional viva examinations. Our results concord with this possibility (45% of the students' agree with the statement). This may be due to undue secrecy associated with the questions asked and the way by which marks allotted to the students. Also, in traditional viva, there is no check on the examiners about quality of viva they conduct and appropriateness of the marks they allot to the students. Also, no record is maintained in this pattern. These factors might have led to this opinion by the students.

48.6% of the students felt that peer student's performance affects their scores in conventional viva. In a given batch of students, depending upon performance by first few students, examiner sets his mind to ask questions of a particular difficulty level and decide a particular pattern for allotment of scores. Thus, in a batch of well performing students, if any student performs average, there are chances that he gets below average scores compared to a student having similar performance from a poorly performing batch.

Statements 5 to 10 of the questionnaire were about the perception of the students about the viva they had just faced. i.e. these were indicative of the quality of the viva. It was observed that 85.3% of the students opined that the syllabus was appropriately covered in the viva, while 91.8% felt that sufficient time was given by the examiners to answer the questions. Hopping 28.8% of the students revealed that equal time was not given to all the students in the viva they had faced. It is a our common experience that if an examinee is outperforming in the viva, the examiner has a tendency asks him more number of questions to test his depth of knowledge, thus taking his viva for a longer time. Also, towards the end of a viva session, may be due to examiner's fatigue or some other reasons, examiners are more inclined to finish the viva faster, thus they give less time to the students present in the last part of a batch. This might have reflected in this expression by the students.

Giving hints by the examiners to the students to elicit correct answer is an area of debate. Some feel it to be totally unethical, as the examiner, by giving hints, favours a student , which is not expected in an ideal viva. This also causes injustice to other students who do not require the examiners favour to reach the correct answer. However, others feel that, as students are under considerable stress during viva, though having adequate knowledge, they may not be able to recollect it and the examiner, by giving hints simply helps him to recollect the answer. In this study, 68.1% of the students told that examiners gave hints to them to elicit correct answer. 72.5% of the faculty agreed with it. Thus

the practice of giving hints is widely prevalent in conventional viva.

In the present study, 91.8% students opined that sufficient time was given to answer the questions. 8.9% of them felt that this method of assessment does not have adequate transparency. This may be due to the fact that the examiners ask the questions randomly, without keeping any records of the questions asked and answers received, marks allotted to each question, marking pattern of these questions. Even the questions asked to a student may not the same to those asked to another students. These issues creates unnecessary mystery about the traditional viva. This might have led to the students to have the impression of inadequate transparency during viva. Also, as no records are kept, there is no redressal mechanism for students.

Figure 1 shows the perception of students about the traditional viva by gender. From the figure, it is seen that for the all 10 statements, the perception of male students was similar to that of female students, the difference was not statistically significant.

Figure 2 shows psychological status of the students in the examination hall. From the graph it is clear that, 73.9% students were under high degree of stress while 69.7% of them reported medium to high degree of anxiety during the conventional viva. Holloway et al. (1967) [3] have demonstrated an inverse relationship between anxiety and performance in oral examinations. In this situation, as expected, the comfort level of the students is bound to low. Only 18.9% of the students were at high level of comfort during the traditional viva. While conducting the

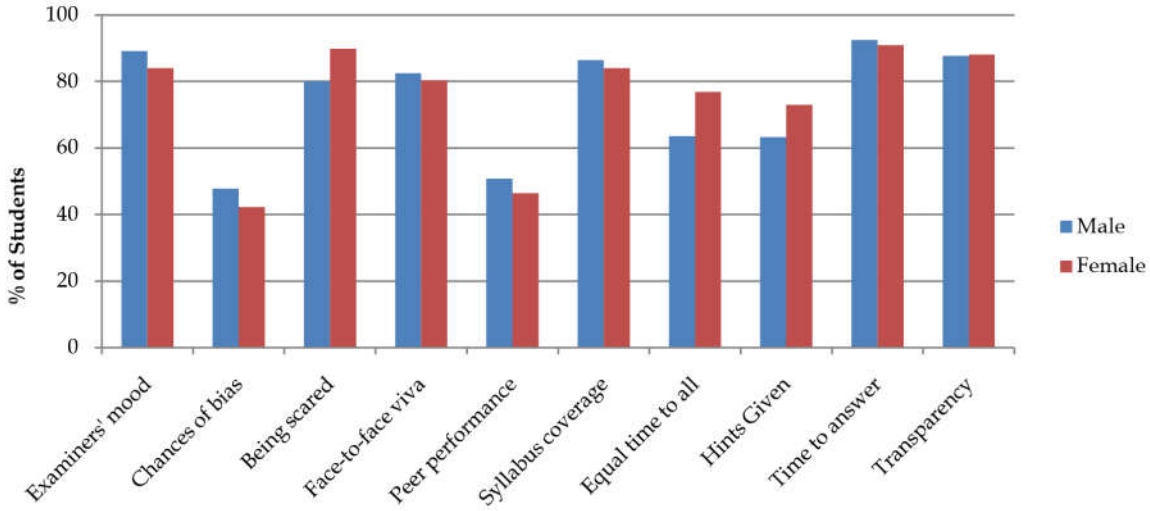

Fig. 1: Perception of Students About Conventional Viva: By Gender

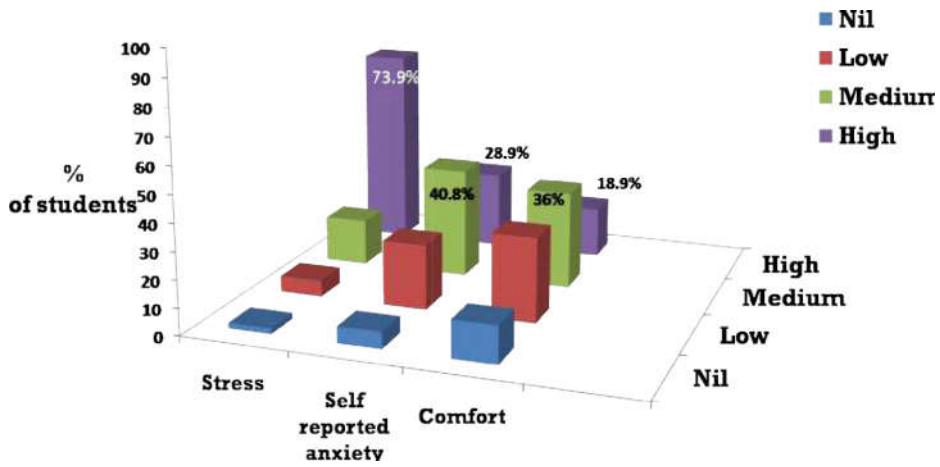

Fig. 2: Psychological Status of Students during Viva

study, many students, in person, requested us to take care of their comfort.

Table 3 shows the psychological status of the students in the examination hall by gender. From the table it is clear, that the female students were more prone to stress and anxiety than their male counterparts, however, the difference was not statistically significant. Also, the female students were less comfortable during the examination than their male counterpart, the difference was statistically significant. Thus, our observations warrant that examiners need to be made aware of students' mental condition and be motivated to improve it, which in turn may result in better performance by them.

Figure 3 shows the perception of faculties about the conventional viva in anatomy. From the figure, it is seen that about one third of the faculties agreed that the effect of mood affects the marks allotted to the students. About 7.5% of the faculty felt that there are chances of personal bias in conventional viva. It appears that a remarkable impact of the peers' performance occur on the scores of students. 26% of the faculty agreed that there is carry over effect in this pattern of viva voce. Our study revealed that both students as well as examiners were satisfied with the time allotted to answer questions. In an ideal examination, examiners should give equal time to all the students. The present study revealed that, more than 50% of the examiners did not give equal time to all the students. About 3/4th of the examiners were in a practice of giving hints to the students to lead them to a correct answer. To minimize subjectivity, it is expected that all the students in a batch should be asked same set of questions. Of the 40 examiners, only 3 examiners asked same set of questions to all the students. The inherent drawback of this technique is the monotony it creates. To overcome this, different students may be asked different sets of questions having same difficulty level. Though

Table 3: Psychological Status of Students during Viva: By Gender

Variable	Gender	Nil 0	Low 1 - 25% 1	Medium 26-50% 2	High 51-75% 3	Highest 75-100% 4	High+ Highest 3+4	p
Stress	M	10 (3.4)	27 (9.1)	53 (17.9)	109 (36.7)	95 (32)	72.1	0.610
	F	3 (1.0)	9 (3.1)	48 (16.6)	119 (41.2)	110 (38.1)	79.2	
Self -reported anxiety	M	24 (8.1)	76 (25.6)	119 (40.1)	75 (25.3)	3 (1.0)	26.3	0.145
	F	12 (4.2)	65 (22.5)	120 (41.5)	80 (27.7)	12 (4.2)	32.2	
Comfort	M	33 (11.1)	87 (29.3)	111 (37.4)	51 (17.2)	15 (5.1)	22.2	0.045*
	F	48 (16.6)	96 (33.2)	100 (34.6)	36 (12.5)	9 (3.1)	15.7	

(M-males, F-females; figures in parenthesis indicate %, * statistically significant)

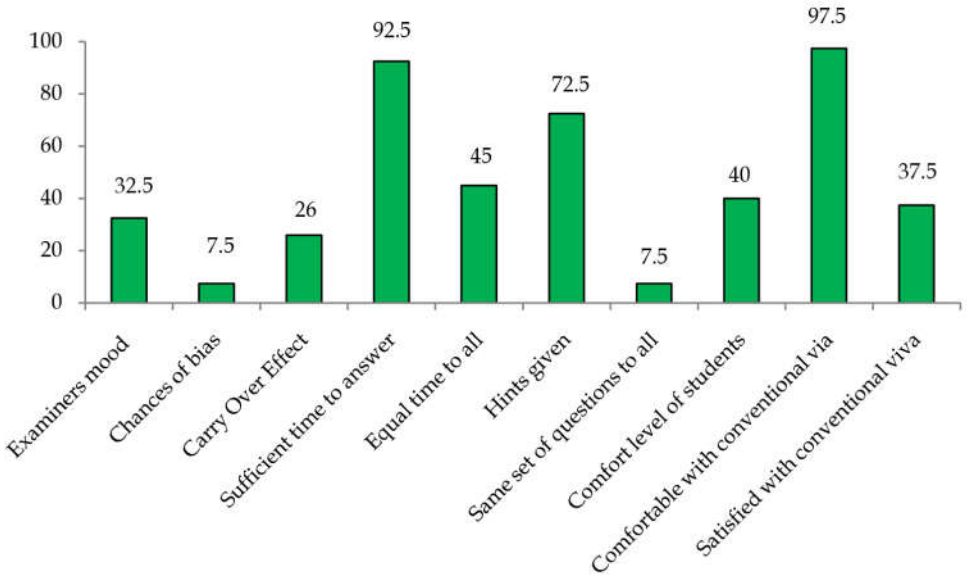

Fig. 3: Perception of Faculty About Conventional Viva

almost all the examiners were comfortable with the current pattern of viva voce, about 2/3rd of them were not optimally satisfied with it.

Due to unavailability of data with regards to the perception of viva examination among medical students, comparison among students from different disciplines, regions or from other countries was not possible. Thus, there is a need to conduct more studies of this nature to shed light on this important issue.

From our study, it is evident that conventional viva has inherent drawbacks. To overcome this, many authors have suggested OSPE [4-8]. However, we would like to suggest, 'Monitored viva by sensitized and trained examiners' as an efficient method for assessment in the Indian scenario. Currently, in India, once a teacher completes 5 years of teaching experience, he/she become eligible for examinership. This practice needs to be changed. The teachers should be sensitized about the drawbacks of conventional viva and effects on student's academic preparation, career, psychosocial status and in general on the health of the society when he passes/ fails due to a badly conducted examination. Further, the teachers need be sensitized about their ethical and motivational role as examiners. The teachers can be trained by the universities for different facets of an ideal viva examination. It should also include training about how to develop a comfort zone between examiner and examinee. After training, there should be a qualifying examination, following which the teacher can be allotted examinership.

We also feel that conscious monitoring may improve the quality of viva. The viva can be monitored by external observer. Alternatively the viva can be conducted in-camera. In-camera viva, in addition, will be useful in giving valuable feedback not only to the students but also the examiners. It will also have an important role in the development of student redressal mechanism. The quality of examination also can be assessed by taking examinees' feedback. Monitored viva by sensitized and trained examiners, in addition to the advantages of Structured Viva, will have enough flexibility to assess in depth the knowledge of the examinee, their attitude, professional competence, understanding & way of understanding of the subject and the ability to discuss and defend.

Conclusion

The practical examination in anatomy in most of the medical colleges in India is conducted by traditional viva method. This study brings out the inherent drawbacks of this assessment tool and underlines an urgent need to appraise the current pattern of viva voce. We are of the view that the best feasible option in a set up like ours is 'monitored viva by sensitized and trained examiners'.

Competing Interests: The authors declare that they have no competing interests.

Acknowledgements

We acknowledge and thank the Ist MBBS students and faculty for their active and enthusiastic participation in the study.

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Original Article

Indian Journal of Anatomy
Volume 7 Number 4, July - August 2018
DOI: http://dx.doi.org/10.21088/ija.2320.0022.7418.13

A Quantitative Study of Palmar Dermatoglyphics in Congenital Heart Diseases

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Abstract

Introduction: Dermatoglyphics refers to the branch of science which studies the patterns of skin ridges present on fingers, toes and soles of human being. Since ancient times these ridge patterns and lines were used by palmists and future tellers for predicting the future. Recently the scope of dermatoglyphics has been amply recognized with expanding horizons of medical science in explaining certain diagnostic and aetiopathological riddle in various diseases, especially with heridofamilial background. The present study is undertaken to study the dermatoglyphic pattern in congenital heart diseases (CHD) and to compare it with previous studies. *Materials & Methods:* The cross sectional study with comparison group was designed. Hundred patients of congenital heart diseases (CHD) i.e. CHD group and hundred patients without CHD i.e. control group were examined during study period. Dermatoglyphic prints were obtained by using standard protocol method and finger tip patterns i.e. Arches, whorls, radial loops and ulnar loops were studied. The quantitative parameters like whorl loop index, triradial count, pattern intensity index and 'atd' angle were studied and analysed. *Results:* Among the quantitative parameters, whorl loop index, triradial count and pattern intensity index showed statistically insignificant difference in CHD group and control group. But 'atd' angle was increased significantly in CHD group as compared to control group. *Conclusion:* There was statistically significant increase in the values of 'atd' angle in CHD group as compared to control group.

Keywords: Dermatoglyphics; Whorl Loop Index; Triradial Count; Pattern Intensity Index; 'ATD' Angle.

Introduction

Dermatoglyphics refers to the branch of science which studies the patterns of skin ridges present on fingers, toes and soles of human being. Since ancient times these ridge patterns and lines were used by palmists and future tellers for predicting the future. In 17th century it was studied scientifically for the first time by anatomist Midlow. Thumb print is used till date by illiterates as a mark of signature. Recently the scope of dermatoglyphics has been amply recognized with expanding horizons of medical science in explaining certain diagnostic and aetiopathological riddle in various diseases, especially with heridofamilial background.

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Received | 14.04.2018, **Accepted** | 05.05.2018

Certain definitive dermatoglyphic patterns were released when many workers observed that significant deviations were present on dermatoglyphic pattern in some conditions which are thought to be genetically influenced like Mongolism, Turner's syndrome, Mental retardation and Leukemia. The dermatoglyphic patterns were also studied in Cardiovascular disorders, Diabetes, Schizophrenia and ABO blood groups, which are thought to have genetic influence.

The present study is undertaken to study the dermatoglyphic pattern in congenital heart diseases (CHD) and to compare it with previous studies.

Aims & Objectives

- To study the quantitative parameters of palmar dermatoglyphics in normal and CHD patients
- To compare the quantitative parameters of palmar dermatoglyphics of CHD group with control group
- To compare and correlate the findings of present study with previous studies

Materials & Methods

The present study was carried out in one hundred patients of CHD and one hundred control individuals. Out of one hundred patients of CHD, sixty two were males and thirty eight were females. The control cases were fifty six males and forty four females.

The palmar prints of patients with CHD and control group were collected. The age group of CHD patients was ranging from 6 – 24 years and that of control group was from 18 – 25 years.

The dermatoglyphic prints were taken using following method:

- Subjects were asked to wash their hands with soap and dry, to remove dust from palms
- Kores duplicating ink was applied on palms and palmar prints were taken on a white drawing paper
- For smearing the ink special ball was used, which was prepared from cotton gauze and linen
- Paper was kept on clean hard surface and the inked hand was placed on the paper
- At first, palmar aspect of patients wrist placed firmly on paper then all the fingers were firmly pressed on paper one by one
- Each finger tip was rolled for getting complete prints
- The prints were studied with the help of hand lens and following quantitative parameters were studied

1. *Whorl Loop Index:* This is a ratio of the number of whorls to the number of loops (Radial and Ulnar) in each palm
2. *Triradial Count:* This is a count of the total number of triradii in the palm print of an individual
3. *Pattern Intensity Index:* It gives an idea about the frequency of triradii per digit

   Pattern Intensity Index = [(2× Whorls) + Loops] ÷ n

   Where, n = Number of fingers
4. *'ATD' angle:* It is formed by lines drawn from digital triradius 'a' to the axial triradius 't' and from axial triradius 't' to digital triradius 'd' (Fig. 2)

In case of more than one axial triradius, the widest 'atd' angle, the angle emanating from the distal axial triradius is counted.

The more distal the position of 't', larger the 'atd' angle. It is most widely used method in interpreting the position of triradius 't'.

The prints were studied with help of above parameters.

Fig. 1. Materials used for taking dermatoglyphic

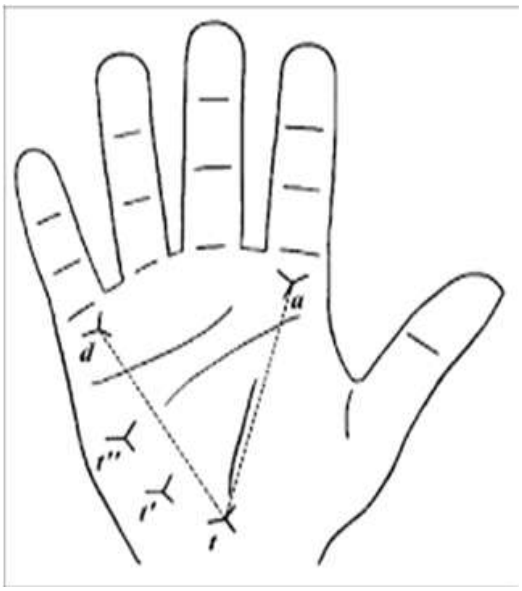


Fig. 2: Measurement of 'atd' angle prints

Fig. 3. Finger tip patterns

Statistical Analysis

- For statistical analysis mean, standard deviation (S.D.) and Z test were used
- For example: For parameter Y

  Mean in cases is P1; Standard deviation is S.D.1; Number of cases studied are N1

  Mean in controls is P2; Standard deviation is S.D.2; Number of controls studied are N2
- Standard error of difference between two means (SEM)

  SEM = Square root of [(S.D.1 × S.D.1 ÷ N1) + (S.D.2 × S.D.2 ÷ N2)]

  Z = (P1 - P2) ÷ SEM
- If $Z > 1.96$ i.e. $p < 0.05$ then it indicates statistically significant difference in the frequency of parameter Y in cases and control group
- Observations were tabulated and analysed

Results

Out of 100 patients with CHD, 62 were males and 38 were females. The incidence of CHD was more in males (62%) than in females (38%)

In the present study, following quantitative parameters were studied for statistical analysis

1. Whorl Loop index
2. Triradial Count
3. Pattern Intensity Index
4. 'atd' Angle

These parameters were observed in male and female respectively. The observations were tabulated and analysed taking the findings of male and female together.

Discussion

1. Whorl Loop Index

This parameter was not studied by any worker before, we have studied this parameter to find any significant correlation of whorl loop index between CHD group and control group.

The present study shows that there was high whorl loop index in right hand than left hand in both CHD and control groups. This difference was not significant. The difference in the mean values of whorl loop index in CHD group and control group was found to be statistically insignificant.

Table 1: Mean of Whorl Loop Index in right and left hands combined

CHD group		Control group		
Cases	**Whorl Loop Index Mean ± S. D.**	**Cases**	**Whorl Loop Index Mean ± S. D.**	
200 Palms	0.27 ± 0.12	200 Palms	0.36 ± 0.19	Z = 0.8 P > 0.05 Insignificant

Table 2: Mean of Triradial Count in right and left hands combined

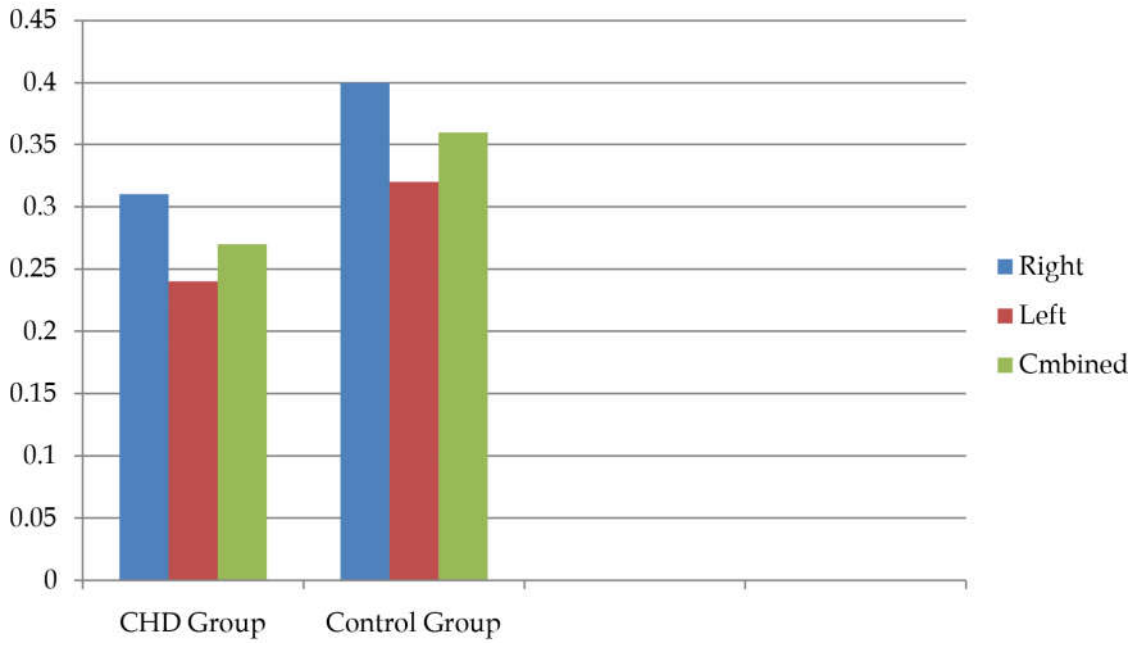
CHD group			Control group			
Cases	**Total Triradial Count**	**Triradial Count Mean ± S. D.**	**Cases**	**Total Triradial Count**	**Triradial Count Mean ± S. D.**	
200 Palms	2286	11.43 ± 1.04	200 Palms	2203	11.01 ± 0.83	Z = 1.93 P > 0.05 Insignificant

Table 3: Mean of Pattern Intensity Index in right and left hands combined

CHD group		Control group		
Cases	**Pattern Intensity Index Mean ± S. D.**	**Cases**	**Pattern Intensity Index Mean ± S. D.**	
200 Palms	1.18 ± 0.17	200 Palms	1.18 ± 0.21	Z = 0.76 P > 0.05 Insignificant

Table 4: Mean of 'atd' angle in right and left hands combined

CHD group		Control group		
Cases	**'atd' angle Mean ± S. D.**	**Cases**	**'atd' angle Mean ± S. D.**	
200 Palms	49.29 ± 3.31	200 Palms	44.21 ± 3.11	Z = 6.83 P < 0.05 Significant



Graph 1: Mean values of Whorl Loop Index in right and left hands

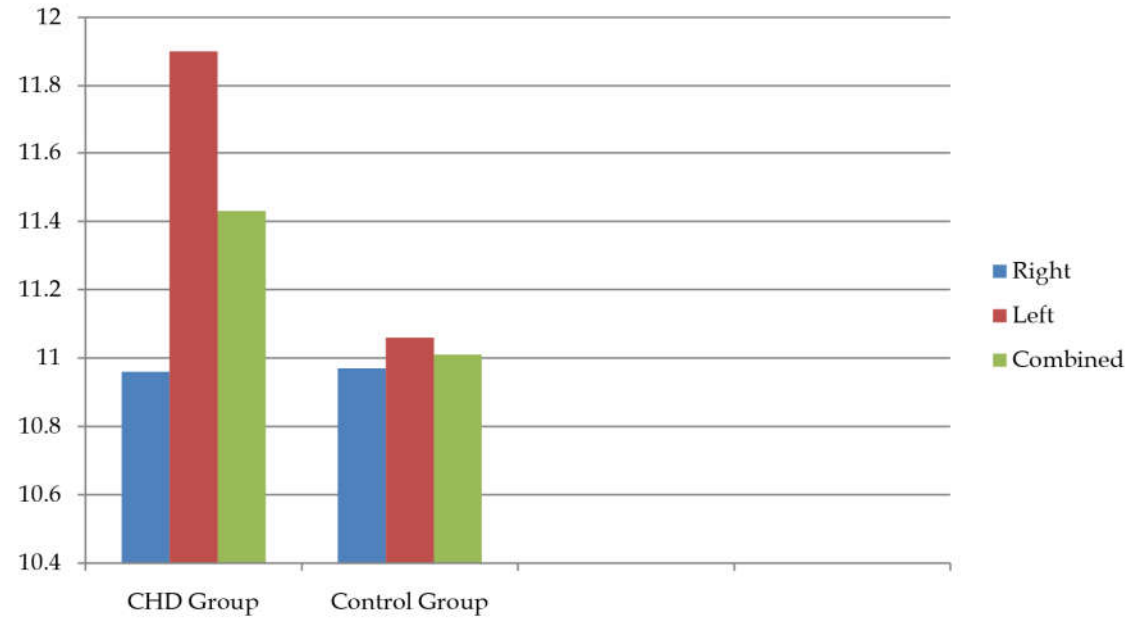
2. *Triradial Count*

This parameter was not studied by any worker previously. It was studied here to find any significant difference in the triradial count in CHD group and control group.

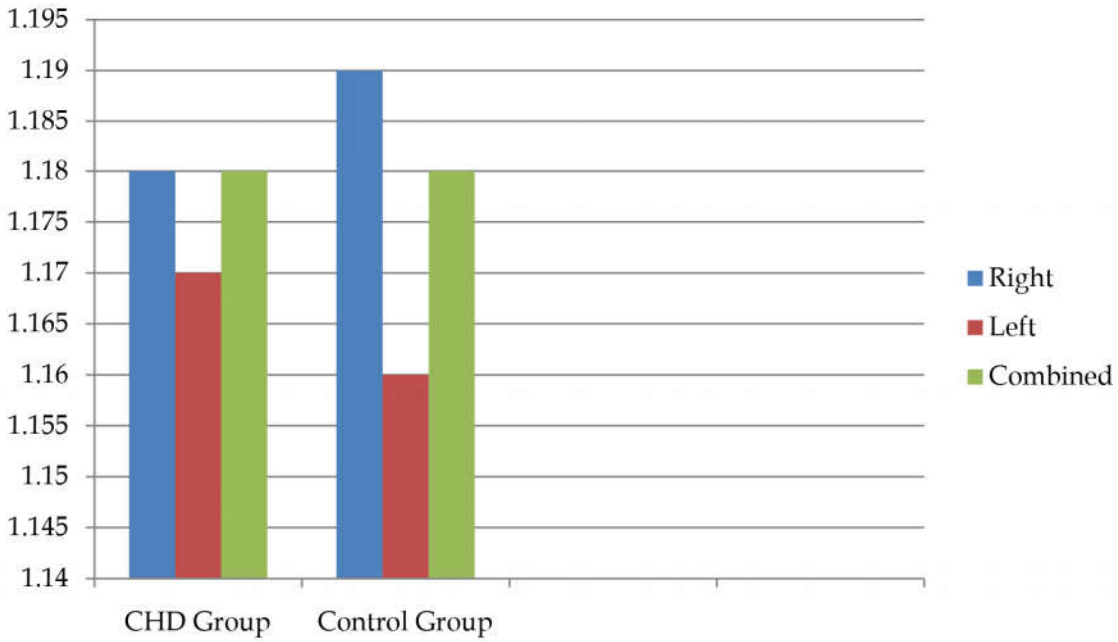
This graph shows that there was lower triradial count in right hand than in left hand in both CHD and control groups. There was increase in the mean values of triradial count in CHD group in left hand as compared to control group. This difference was found to be statistically insignificant.

3. *Pattern Intensity Index*

This parameter was also not studied by any of the previous workers. It was studied here to find any significant difference in pattern intensity index in CHD group and control group.



Graph 2: Mean values of Triradial Count in right and left hands



Graph 3: Mean values of Pattern Intensity Index right and left hands

This graph shows that there was increase in the pattern intensity index in right hand than that of left hand in both the groups. There was slight increase in the mean values of pattern intensity index in left hand in CHD group as compared to control group. All these differences were found to be statistically insignificant. The mean values of pattern intensity index in both the groups are almost same.

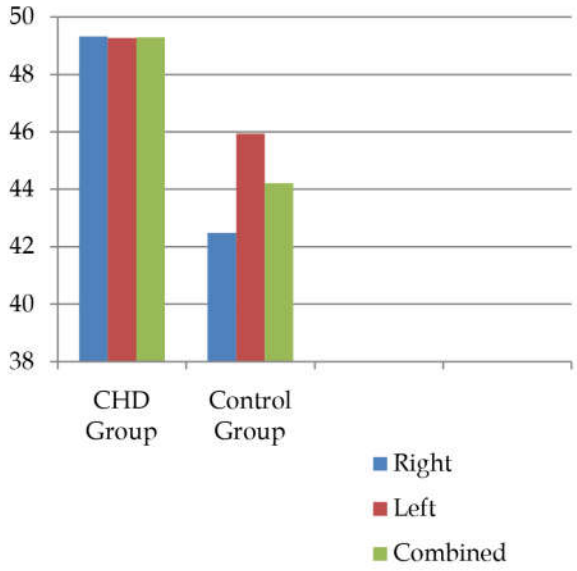
4. 'atd' Angle

In CHD group the mean values of 'atd' angle in right hand was 49.32 and in left hand it was 49.27. In control group mean values of 'atd' angle in right hand was 42.48 and in left hand it was 45.94.

The mean value of 'atd' angle in CHD group was significantly higher than that of control group and this difference was statistically significant.

This graph shows that there is significant increase in the values of 'atd' angle in both right and left hands in CHD group as compared to control group. Hence the mean value of 'atd' angle is also increased in CHD group as compared to control group.

The quantitative parameters like whorl loop index, triradial count and pattern intensity index were not studied by any of the previous workers, hence comparison was not possible.



Graph 4: Mean values of 'atd' Angle right and left hands

Table 5: Comparison of the mean values of 'atd' angle (Right and left hands combined)

Workers (Year of study)	CHD Group	Control Group
A Sanchez Cascos (1964)	55.23	47.23
Rathod (1993)	43.50	41.50
Present study	49.29	44.21

A Sanchez Cascos found significant increase in the values of 'atd' angle in CHD group as compared to control group. Hence present study correlates with the study done by A Sanchez Cascos.

According to Rathod the difference in the mean values of 'atd' angle in CHD group and control group was not statistically significant.

Conclusions

- The palmar axial triradius is shifted distally in CHD group as compared to control group
- There is significant increase in the mean values of 'atd' angle in CHD group as compared to control group
- No statistically significant difference is found in the values of whorl loop index, triradial count and pattern intensity index in CHD group and control group
- A large scale study should be undertaken to draw more useful and definitive conclusions regarding the value of dermatoglyphics in congenital heart diseases.

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Original Article

Indian Journal of Anatomy
Volume 7 Number 4, July - August 2018
DOI: http://dx.doi.org/10.21088/ija.2320.0022.7418.14

Branching Pattern of Axillary Artery: A Morphological Study and It's Embryological Significance

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Abstract

Background: Axillary artery is a continuation of the Subclavian artery, extending from outer border of first rib to the lower border of Teres Major muscle. The variations in the branching pattern of Axillary artery is not uncommon. Any deviation in the development of the vascular plexus of the limb bud may be responsible for the variations in the branching pattern. The knowledge about such variations in the branching pattern of Axillary artery is important in relation to Coronary bypass and flaps in reconstructive surgeries, treating Axillary artery thrombosis, creating the Axillary-Coronary bypass shunt in high risk patients. Recent progress in vascular surgery has emphasized a need for precise knowledge of frequency of anatomical variations in the branching pattern of Axillary artery. *Aims:* The aim of the present study was to Analyse the variations in the branching pattern of Axillary artery and it's embryological significance. *Materials and Methods:* Forty upperlimb specimens from embalmed cadavers allotted for dissection in the department of Anatomy at ESIC Medical college and PGIMSR, Rajajinagar, Bangalore over a period of five years was used for the study. *Results:* We came across the presence of variation in the branching pattern in one male cadaver bilaterally. On the right side, all the branches of third part of Axillary artery emerged from commom trunk, whereas on the left side, all three branches of third part and lateral thoracic artery arised from the common trunk. *Conclusion:* The knowledge of branching pattern of Axillary artery is useful in treating Axillary artery thrombosis, reconstructing Axillary artery post-trauma, microvascular graft for replacing damaged arteries.

Keywords: Axillary Artery; Axillary-Coronary Bypass Shunt; Reconstructive Surgeries; Microvascular Graft.

Introduction

Axillary artery is the continuation of the Subclavian artery.It extends from the outer border of first rib to the lower border of Teres Major muscle.It is divided into three parts by the Pectoralis Minor muscle [1]. The branches of axillary artery are Superior thoracic artery from the first part, Lateral thoracic artery and Thoraco-acromial artery from the second part and Subscapular artery, Anterior circumflex humeral artery and posterior circumflex humeral artery from the third part.

In tetrapods the subclavian artery traverses the axilla as the Axillary, parallels the humerus as Brachial and divides in the forearm into Ulnar and Radial arteries [2].

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.

Materials and Methods

The Specimens for this study was obtained from Department of Anatomy at ESIC medical college & PGIMSR, Rajajinagar, Bangalore. Forty upperlimb specimens were obtained from the Twenty embalmed cadavers ,which were allotted for first year MBBS Students for the purpose of dissection over a period of five years. Deformed or traumatized upper limbs were excluded from the

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Received | 19.07.2018, **Accepted** | 28.07.2018

study. We came across the presence of variation in the branching pattern in an adult male cadaver bilaterally, that is two out of forty upperlimb specimens showed variations in branching pattern.

Results

We came across the presence of variation in the branching pattern of Axillary artery in two out of forty upper limbs. All the three branches of third part of Axillary artery, Anterior Circumflex Humeral artery, Posterior Circumflex Humeral artery and Subscapular artery arised from a Common trunk [Figure 1].

Further Circumflex Scapular artery and Thoracodorsal artery emerged from Subscapular artery. The Posterior Circumflex Humeral artery accompanying the Axillary nerve is seen.The branches from second part Lateral Thoracic artery and Thoracoacromial artery was normal [Figure 2].

In the same cadaver, on the left side, the Common trunk gave rise to Anterior Circumflex Humeral artery, Posterior Circumflex Humeral artery, Subscapular artery and Lateral Thoracic artery [Figure 3].

Futher, on the left side Circumflex Scapular artery and Thoracodorsal artery emerged from Subscapular artery. The Axillary nerve accompanying the Posterior Circumflex artery is seen [Figure 4].

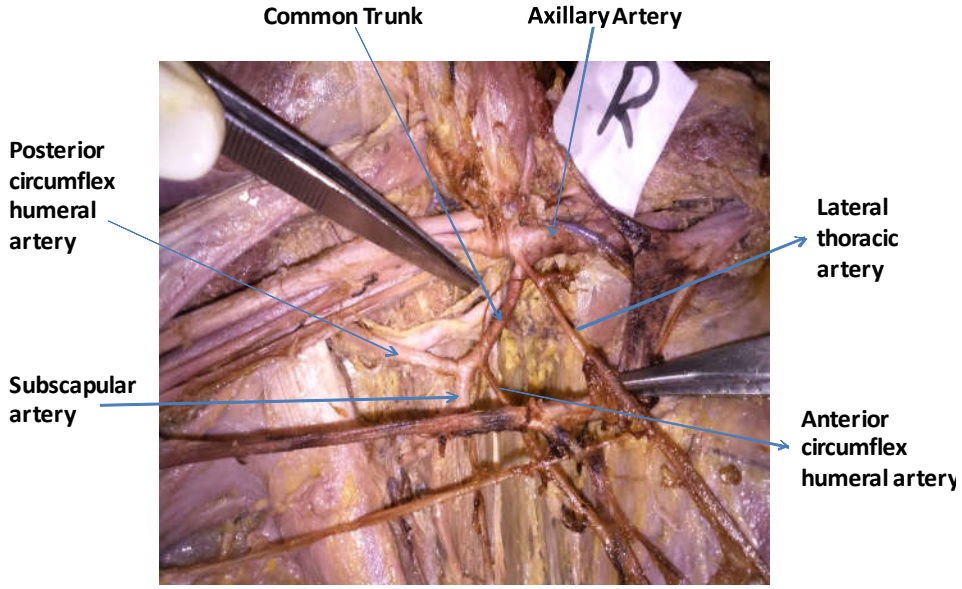

Fig. 1: Common trunk from third part of axillary artery on right side giving rise to posterior circumflex humeral artery,anterior circumflex humeral artery and subscapular artery

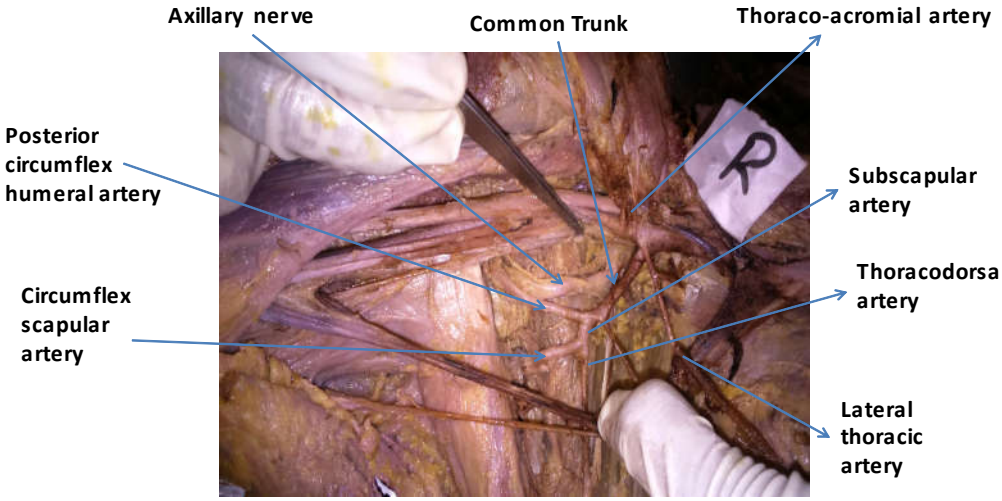

Fig. 2: Subscapular artery giving rise to cirumflex scapular artery and thoracodorsal artery on the right side.Posterior circumflex humeral artery accompanying axillary nerve is also seen

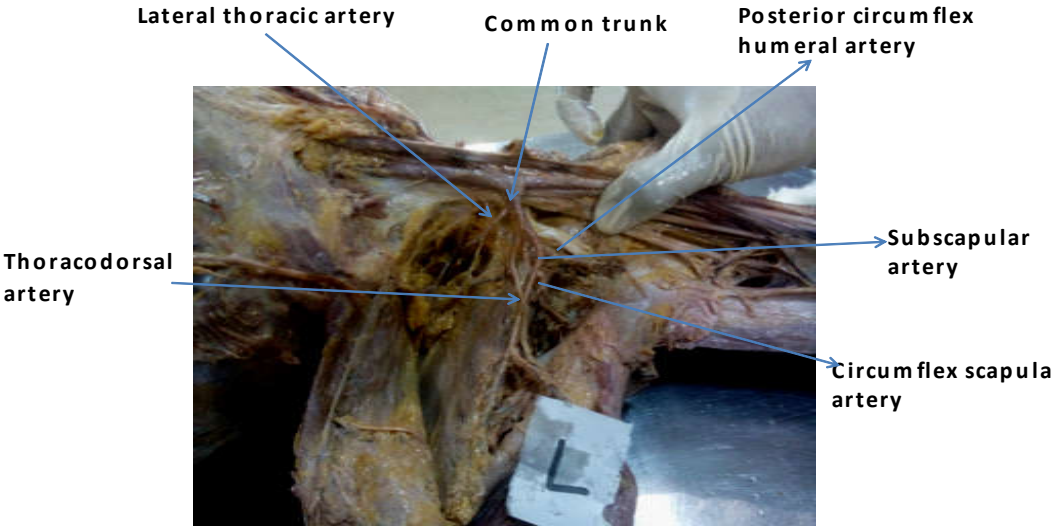

Fig. 3: Common trunk from third part of axillary artery on left side giving rise to posterior circumflex humeral artery,anterior circumflex humeral artery, subscapular artery and lateral thoracic artery

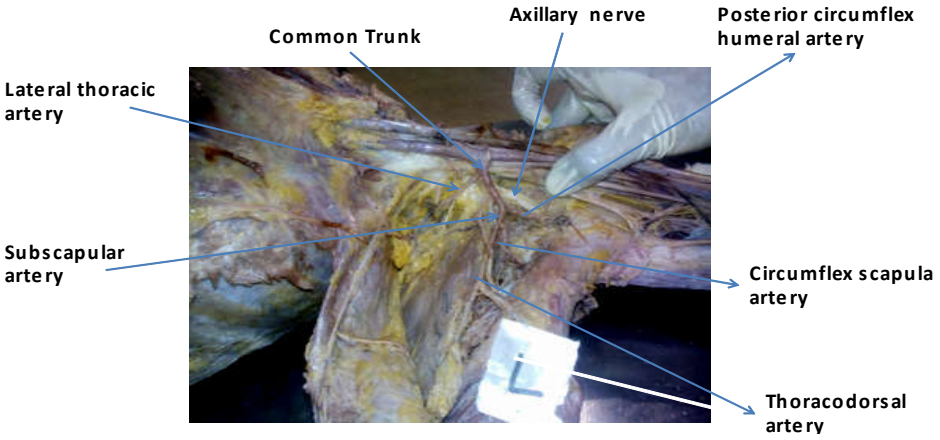

Fig. 4: Subscapular artery giving rise to cirumflex scapular artery and thoracodorsal artery on the left side. Posterior circumflex humeral artery accompanying axillary nerve is also seen.

Discussion

Anterior and Posterior Circumflex Humeral branches of the third part of Axillary artery are subject to great variations [3].

The common arterial trunk from third part of Axillary artery gave rise to Anterior and Posterior Circumflex Humeral, Subscapular, Radial collateral, Middle collateral and Superior Ulnar collateral arteries with absence of Profunda brachii artery [4].

Arterial variations in the upperlimb are due to defects in embryonic development of the vascular plexus of upperlimb bud. This may be due to 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 upperlimb vessels [5].

The seventh cervical intersegmental artery forms the axis artery of upperlimb and persists in the adult to form the Axillary, Brachial and Interosseous arteries. The number of upperlimb arterial variations arise through the persistence, enlargement and differentiation of parts of the initial network which would normally remain as capillaries or even regress [6].

Anomalous branching pattern of Axillary artery represents persisting branches of the capillary plexus of the developing limb buds and their unusual course, it may be a cause for concern to radiologists and vascular surgeons and may lead to complications in surgeries that involve the axilla and pectoral regions [7].

Accurate knowledge of the normal and variant arterial anatomy of Axillary artery is important for clinical procedures in this region. Branches of

Axillary artery are used for Coronary bypass and flaps in reconstructive surgeries [8].

According to Arey, unusual blood vessels may be due to choice of unusual paths in the primitive vascular plexuses, persistence of vessels normally obliterated, disappearance of vessels normally retained, incomplete development, fusions and absorption of parts usually distinct [9].

De Garis and Swartley described 23 different types of axillary artery. They said that there is a greater tendency in the Negro than there is in white persons towards clumping of the branches,with two or more arising in common.Trotter and her associates found a sex difference,common origin of two or more vessels being more frequent in females but no significant difference between races in males [10].

Seventh cervical intersegmental arteries grow into the limbbuds to form axis arteries of the developing upper limbs. Axis artery gives rise to Subclavian, Axillary and to the Deep Palmar arch. Other arteries of the upper extremity develop as sprouts of axis artery [11].

The branches of upper limb arteries have been used for Coronary bypass and flaps in reconstructive surgeries, antegrade cerebral perfusion in Aortic surgery, treating Axillary artery thrombosis, reconstructing Axillary artery after trauma using the artery for microvascular graft to replace damaged arteries, creating Axillary Coronary bypass shunt in high risk patients, surgical procedures of fractured upper end of Humerus. Aneurysm of Axillary artery may enlarge and compress the trunks of Brachial plexus, causing pain and anesthesia in the areas of skin supplied by affected nerves. Aneurysm of Axillary artery may occur in baseball pitchers because of their rapid and forceful arm movements [12].

Based on Muller's model,the disappearance of the superior,middle and inferior superficial brachial arteries and the superficial antebrachial artery, and the distal parts of the median and interosseous arteries and the persistence of the deep brachial artery cause the normal arterial system to be constructed [Figure 5] [13].

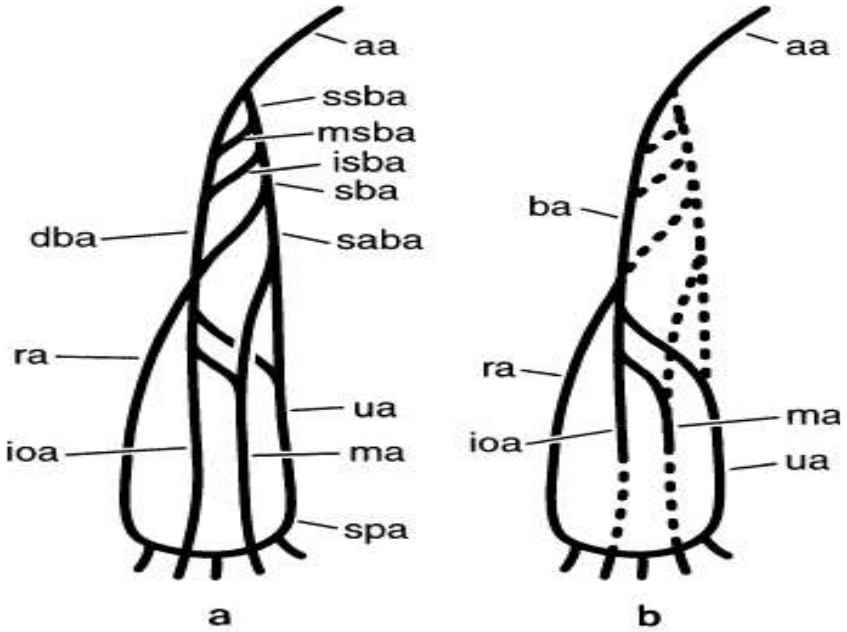

Fig. 5a: Modified reconstruction of the arterial system of the arm in a human embryo 11.7 mm long from Muller (1903)
b: Normal arteries in the arm are shown as solid lines.

Full forms of Abbreviations used in Figure 5

- aa-axillary artery
- dba-deep brachial artery
- ioa-interosseous artery
- ra-radial artery
- ua-ulnar artery
- ma-median artery
- sba-superficial brachial artery
- saba-antebrachial artery
- ssba-superior superficial brachial artery

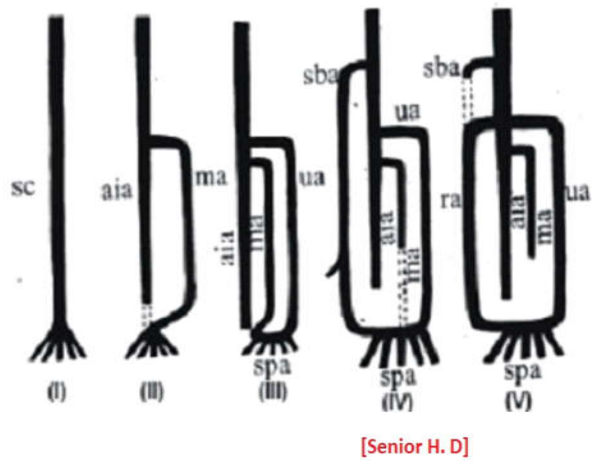

Fig. 6: Development of arteries of upper limb in 5 stages [15]

The current understanding regarding development and variations of upperlimb arteries is derived from early descriptive studies on human or laboratory animal embryos, and several theories have been proposed (Von Baer,1828; Baadar 1866, Hochstetter 1890, 1891; Gosppert 1904, 1910; Sabin 1905,1917; Rabl 1907; Elze 1908, 1913,1919; Evans1908, 1909). In Humans, De Vriese (1902) described the arteries as originating from an initial capillary network associated witheach of the principal nerves, whereas Musller (1903) considered they were formed by the union of superficial and deep pathways [14].

Conclusion

Any surgical procedures in pectoral and axillary regions require accurate knowledge of normal and variant arterial anatomy of Axillary artery.The knowledge regarding normal and variant arterial anatomy is a must for surgeons in avoiding iatrogenic injuries and radiologists for interpreting of angiograms. Branches of upperlimb arteries have been used for Coronary bypass and flaps in reconstructive surgeries.The knowledge of branching pattern of Axillary artery is useful during antegrade cerebral perfusion in Aortic surgery, treating Axillary artery thrombosis, reconstructing Axillary artery after trauma, using artery for microvascular graft to replace damaged arteries. 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.

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Original Article

Indian Journal of Anatomy
Volume 7 Number 4, July - August 2018
DOI: http://dx.doi.org/10.21088/ija.2320.0022.7418.15

Morphological and Morphometricstudy of Suprascapular Notch

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Abstract

Background and Aim: The Suprascapular notch is present at the anterolateral end of the superior border of scapula medial to the root of the coracoid process. The notch is bridged by the superior transverse scapular ligament which is attached laterally to the root of the coracoid process and converts the notch into the foramen. This foramen transmits the suprascapular nerve (SSNr) to the fossa. This study was focused on different types of the suprascapular notch (SSN) and its combination of the anomalous superior transverse scapular ligament (STSL) was considered as a risk factor for Suprascapular nerve entrapment. *Materials and Methods:* This study was done in 100 human dry scapulae. The shapes of the SSN, partially or completely ossified STSL were noted and the maximum depth, superior and middle transverse diameters of suprascapular notches was measured. The data analysis of the notches was recorded and correlated with previous studies. *Results:* The shape of the SSN was observed and classified into six types. The most common type of notches ″U″ shaped and less common type was small "V" shaped. The partially or completely ossified STSL was also observed in this study. *Conclusion:* The anatomical knowledge of various types of SSN and the prevalence of ossified STSL is important for clinicians for giving suprascapular nerve block. The Knowledge of anatomical variations of SSN helps the orthopedic surgeon to diagnose the cause for painful syndromes of shoulder and the early management which helpsforgood functional recovery.

Keywords: Suprascapular Notch; Ossified Superior Transverse Scapular Ligament; Suprascapular Nerve Entrapment.

Introduction

Suprascapular artery and Vein enter Suprascapular fossa by traveling over the STSL, but the Suprascapular nerve passes beneath the ligament[1]. Suprascapular nerve entrapment is the most common lesion due to a congenital abnormality of the scapula with narrow 'v' shaped, the absence of suprascapular notch and thick band or ossified STSL. In rotator cuff injuries, occupational injuries, tumors, ischaemic injuries to nervivasorum of the SSNr have become increasingly recognized as a cause for shoulder pain and dysfunction. The SSNr supplies motor innervation to the supraspinatus and infraspinatus muscles and sends articular branches acromioclavicular and glenohumeral joints. The anomalous STSL in combination with narrow and absence of the notch markedly reduces the space and chances to have SSN entrapment as a result of trauma, repetitive over usage in proportion to the magnitude and duration.

Rengachary et al. [2] examined 211 adult cadaveric scapulae and categorized the shape of SSN into six different types. The most common types "U" shaped" notch in 48 percent and less common type was small "V"-shaped" notch in 3 percent of cadavers. It had been hypothesized that SSNr entrapment was more likely to be associated with absence and very small "V"-shaped SSN. The mechanism by which the injury atSSN leads to kinking of the nerve against the ligament had termed as the sling effect [3]. The evaluated motion of the SSNr in relation to the inferior margin of the STSL with various moments like depression, cross adduction and hyperabduction of the shoulder was

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Received | 26.06.2018, **Accepted |** 07.07.2018

the cause for SSNr entrapment. The morphology of SSN and its combination of anomalous STSL were considered as a risk factor for SSNr entrapment [4-8] occupational injury.

Based on the measurementNatsis et al. [9], classified theSSN into five types as Type I- Without a discrete notch, Type II a notch with a longer transverse diameter (MTD) than a vertical diameter (VMD), Type III a notch with longer vertical than transverse diameter, Type IV a bony foramen and Type V a notch and a bony foamen.

Based on the measurement Michal polguj et al. [10] classified the SSN into five types as:

Type I- longer maximum depth than the superior transverse diameter (MVD>STD) Type II- a notch with equal MVD, STD and MTD (MVD=STD=MTD)

Type III- a notch with STD was longer than the maximal depth (STD>MVD)

Type IVa bony foramen

Type V-discrete notch.

Type I and Type III were divided into three subtypes: A- MTD was longer than STD (MTD>STD), B- (equal MTD=STD) and C- (MTD<STD)

Nafees Fatima et al. classified five types of SSN as Type I Deep "U" shaped, Type II shallow "U" shaped, Type III "J" shaped, Type IV "V" shaped and Type V as Indented.

Iqbal et al. classified the SSN into five types as Type I "J" shaped, Type II "U" shaped, Type III "V" shaped, Type IV absence of notch and Type V indentation of the notch.

Methods

This study was done in 100 adulthumanscapulae 54 right and 46 left sided with unknown sex in the department of anatomy, Meenakshi Medical College, Kancheepuram, Tamil Nadu.

Exclusion Criteria

The damaged superior border of the scapula

Inclusion Criteria

Only adult scapula

Based on the study of Rengachary et al the SSN was classified into six types: (Fig. 1a-1f)

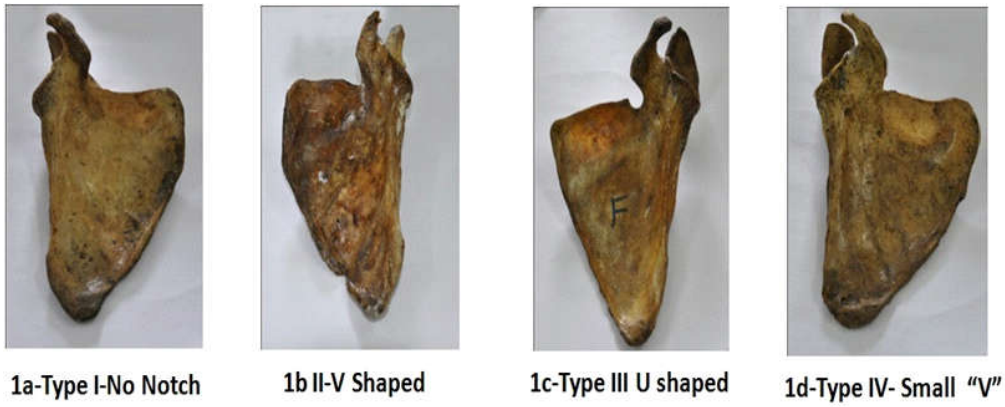

Fig. 1:

Type I- the absence of notch (no discrete notch)

Type II- "V" shaped

Type III- "U" shaped

Type IV- Small "V" shaped

Type V- Partially ossified Superior transverse scapular ligament

Type VI- Completely ossified Superior transverse scapular ligament

Based on the study of Michel Polguj et al the measurements of SSN were taken as:

The maximum depths, superior and middle transverse diameters of SSN were measured by using vernier caliper.

1. The diameter of the superior border of the scapula to lower margin of coracoid process was measured and marked as STD (Fig. 2a).
2. The maximum vertical depth from the center point of "STD" to the depth of SSN was measured as MVD. (Fig. 2a)
3. The middle transverse diameter was the distance in a horizontal plane between the opposite margins of the SSN was measured as MTD in half dimension of MVD (Fig. 2b).

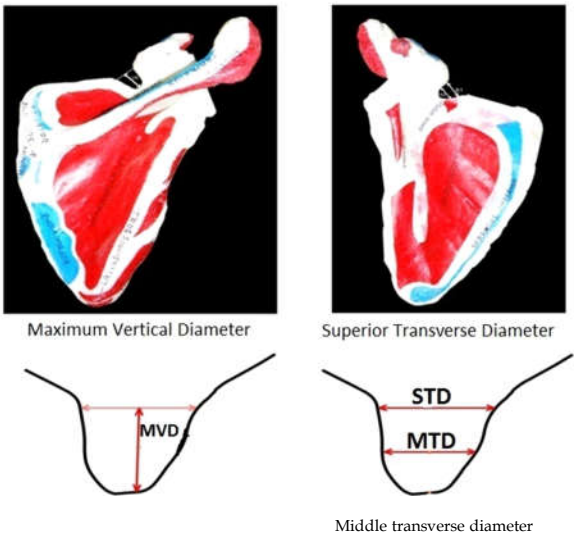

Fig. 2a: **Fig. 2b:**

The data analysis of type I, type II& type III was recorded as the mean, minimum, maximum and standard deviation (Table 5).

Results and Observation

Based on the study of Rengachary SS. et al. SSNwas classified into six types as-

Type I	Absent notch (no discrete notch)	Right side 10 & Left 8= 18 (18%)
Type II	" V" shaped notch	Right side 13 & Left 13= 26 (26%)
Type III	"U" shape notch	Right side 24 & Left 21 =45 (45%)
Type IV	Small "V" shaped notch	Right side 02 & Left 03=05 (5%)
Type V	Partially ossified STSL	Right side 02 & Left 0 =02 (2%)
Type VI	Completely ossified STSL	Right side 01 & Left 03=04 (4%)

The Type III was again classified into Shallow "U" and Deep "U" shaped notch. Type III was observed in 45 scapulae in which shallow "U" was observed in 36 scapulae and deep "U" in 9 scapulae. (Fig. 2g)

Based on the description by M. Polguj et.al then was classified as:

Type I - (MVD>STD) was 9%

Type II (MVD=STD=MTD), was Nil

Type III (STD>MVD), was 67%

Type IV was 4% bony foramen

Type V was 18% (no discrete notch).

In the present study, the partially ossified STSL was also observed in 2% of scapulae

Based on the measurement the TypeI and Type III were again classified into subtypes as A, B, C

Type I -IA 11.1% (MTD>STD), IB-nil (MTD=STD) and IC was 88.9% (MTD<STD).

Type III= IIIA nil, IIIB nil and IIIC was 100%.

Discussion

The absence of suprascapular notch was observed by Rubi Saikia et al. [11] in 17.79%, Raj Kishore et al. [12] in 19.64% by Ukti Desai [13] in Gujarat region was 16%. In the present study, it was observed in 18% which was close to the above studies.

In the present study - Type I- 18%was almost close to the study of usha Kannan [14] and Krishna Gopal [15]. Type II notch was observed in 26% was close to the study of Sinkeet et al. [16], Rengachary et al. The Type III U shaped notches observed in 45%which was close to Manoj Kumar et al. [17] and Rengachary et al. The Type IV in 5% of scapulae which was similar to the study of Sinkeet et al and Usha Kannan. The Type V in 2% which was close to the study of Krishna Gopal et al. and Type VI in 4% which was similar to the study of Rengachary et al Sinkeei et al. and close to Krishna Gopal et al.

In the present study, the partially ossified STSL was observed in 2% and completely ossified STSL was observed in 4% which were not reported by Iqbal

Table 1: Based on the study of Rengachary et al the shape of SSN in the present study was compared with previous studies

Studies	Type I Absent notch	Type II V-shaped	Type III U-shaped	Type IV Small "V"	Type V Partially ossified	Type VI Completely ossified
Rengachary et al	8%	31%	48%	3%	6%	4%
Sinkeet et al	22%	21%	29%	5%	18%	4%
Krishna Gopal	15.83%	41.66%	25%	12.5%	1.67%	3.33%
Manoj Kumar et.al	6.6%	41.5%	44.3%	-----	4.7%	2.8%
UshaKannan et al	20%	10%	52%	4%	4%	10%
Present study	18%	26%	45%	5%	2%	4%

Table 2: The shape of SSN was compared with studies of-of Iqbal et al and Nafees Fatima et al

Studies	Type I (MVD>STD)	Type II MVD=STD=MTD)	Type III (STD>MVD)	TypeIV bony foramen	Type V No notch
Michal Polguj et al2011	24.4%	2.3%	54.7%	7%	11.6%
Michal Polguj et al 2013	24.18%	1.95%	56.16%	4.72%	12.99%
Krishna Gopal et al	20%	3.33%	55.83%	4.16%	17.5%
Vyas KK et al 2013	20.33%	2.67%	42.7%	3.67%	30.67%
Present study	9%	Nil	67%	4%	18%

Table 3: Based on the measurement-Comparisons with previous studies

Studies	Indented notch	V-shaped	Shallow U-shaped	Deep "U" shaped	'J" shaped	Absence of notch
Iqbal et al	26.8%	20%	--	13.2%	22%	18%
NafeesFatima et al	4.87%	5.75%	31.86%	35.84%	21.68%	Nil
Present study	Nil	31%	36%	9%	Nil	18%

Table 4: Comparison of SSN with Natsis et al

Studies	Type I No notch	Type II MTD>MVD	Type III (MVD>MTD)	TypeIV bony foramen	Type V Notch and foramen
Natsis et al	8.3%	41.85%	41.85%	7.3%	0.7%
Present study	18%	13%	63%%	4%	Nil

et al. [18] and Nafees Fatima et al. [19]. In the present study the "J" shaped and indented notches were not observed. Shallow "U" was observed in 36% which was close to the study of Nafees Fatima. Deep "U" shaped notch was close to the study of Iqbal et al. Absence of notch was similar to the study of Iqbal et al. and which was not observed by Nafees Fatima.

In the present study, the partially ossified STSL was observed in 2% and Type II notch was not observed. Type IV was similar to Michal Polguj et al. [20] 2013 and Krishna Gopal et al. and Vyas KK et al. [27] Type V notch was similar to the study of Krishna Gopal et al.

In the present study, the partially ossified STSL was observed in 2% of scapulae. In the present and previous studies, the notch with foramen was not observed.

The very small "V" (type IV) shaped notch and ossified STSL lead to SSNr entrapment and neuropathy [21-24]. The origin of SSNr at a higher level to the notch and the angulation of the nerve is exaggerated during forcible depressive movements of the shoulder girdle. The mechanism by which the injury occurs at SSN has termed as the sling effect with the evaluated motion of the SSN in relation to its notch and the ligament during various movements of arm and shoulder.

The variations of the SSN is a risk factor at suprascapular nerve block, surgical explorations during su prascapular nerve decompression [25] and also during the arthroscopic decompression [26]. The knowledge of anatomical variation of SSN is mandatory for the Orthopedic surgeon to give good results to the patients. The early detection of an

Table 5: Comparative study of results of various parameters of suprascapular notch

	Maximum depth of SSN- Mean±SD(mm)		STD of SSN- Mean±SD (mm)		MTD of SSN Mean±SD (mm)	
	Gopal et al	Present study	Gopal et al	Present study	Gopal et al	Present study
Types I	12.55±4.07	9.3 ± 1.1	8.98±2.76	5.33± 0.57	9.08±2.99	3.66± 0.57
Types II	5.92±2.69	Nil	5.92±2.69	Nil	3.82±1.50	Nil
Types III	7.31±2.02	9.54 ± 2.1	8.50±1.98	11.45± 1.63	8.06±1.78	8.61± 1.81

anatomical variation of SSN will prevent atrophic changes of muscles and the patient will recover early after "The nerve decompression surgery".

Conclusion

This study is useful to predict the patients with occupational risk for SSNr entrapment. The good knowledge of morphometric parameters of SSN and its variations to the base interval (depth) will help for suprascapular nerve block and also during arthroscopic decompression of the suprascapular nerve.

This study was presented to highlight the suprascapular nerve entrapment in "Absent and Small "V" shaped SSN, partially or completely ossified superior transverse scapular ligament.

Abbreviations

SSN- Suprascapular notch

SSNr – Suprascapular Nerves

STSL- Superior transverse scapular ligament

STD- Superior Transverse Diameter

MTD- Middle Transverse Diameter

MVD- Maximum Vertical Depth

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Original Article

Indian Journal of Anatomy
Volume 7 Number 4, July - August 2018
DOI: http://dx.doi.org/10.21088/ija.2320.0022.7418.16

Study on Placenta in Hypertensive Disorders of Pregnancy

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Abstract

Introduction: Hypertensive disorders are the causes of maternal and fetal mortality and morbidity. Ten percent of pregnancies are affected by hypertensive disorders.This study is aimed at studying the morphological and morphometrical changes of the placenta in hypertensive disorder and their effects on fetal growth and to compare them with the normal pregnancy. *Methodology:* Live birth placentae were collected from hypertensive and normal pregnancy (30 in each group). Morphometric measurements of placentae along with morphological changes were recorded. Fetal parameters and maternal history were recorded after the delivery. *Results:* Morphometric parameters of the placentae were reduced in hypertensive disorder which was statistically significant ($p<0.05$) and also morphological changes were observed. Fetal weight and length were also reduced. In hypertensive group, the majority of women had a Caesarean section (C/S) which was statistically significant. *Conclusion:* In this study, we observed that hypertensive disorders will affect the placental morphology and its function thereby affecting the fetal growth. Knowledge of placental and fetal insufficiencies in hypertensive disorder can help to manage and improve the antenatal care of future pregnancy, and management of fetus and mother after delivery.

Keywords: Hypertension; Morphology; Morphometry; Placenta; Pregnancy.

Introduction

Ten percent of pregnancies worldwide are complicated by the hypertensive disorders of pregnancy, including pre-eclampsia, which is one of the greatest causes of maternal and perinatal morbidity and mortality. Hypertensive disorders are classified as pre-eclampsia, eclampsia, chronic hypertension, chronic hypertension superimposed preeclampsia and gestational hypertension[1]. Placentation defects like the failure of trophoblast invasion and spiral artery remodeling, which impede the uteroplacental circulation are said to be the main causes of pre-eclampsia [2]. Still, the etiology of pre-eclampsia is unknown. The placenta is discarded after the delivery, but an examination of the placenta will explain the prenatal events, maternal and fetal health [3]. This further can help to improve the antenatal care in future pregnancy. This study has been taken up to see the morphological and morphometrical changes of the placenta in hypertensive disorder and their effects on fetal growth and to compare them with the normal pregnancy.

Methodology

Placentae of live births were collected from Department of Obstetrics and Gynaecology, Dr. Prabhakar Kore Charitable Hospital, Belagavi, after taking consent from the pregnant women.We collected 30 placentae with a history of the hypertensive disorder (study group) and 30 normal (control) placentae for the study. First, the placenta was observed for cord and membrane attachment, then the membrane and cord were trimmed, and placental weight, volume and surface area were measured. Fetal parameters like birth weight, sex, gestational age and maternal history were also recorded.

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Received | 30.06.2018, **Accepted |** 14.07.2018

Results

In this study, 30 cases were normal and 30 were from hypertensive disorders (Fig. 1). In hypertensive disorder, the mean age of the pregnant women was 26.11±5.06 and in normal it was 23.81±2.24 which was statistically significant i.e. *p*-value was 0.008247 ($p<0.05$). In the study group, 42.86% had a normal delivery and 57.14% under went cesarean section. The difference between them was statistically significant ($p<0.05$). In control group, 50% had a normal delivery and 50% had C/S sections. The distribution of hypertensive disorder group is given in the Table 1.

Table 1: Distribution of hypertensive cases

Hypertensive disorders	Number of cases	Percentage
Gestational hypertension	15	50
Pre-eclampsia	12	40
Eclampsia	3	10
Total	30	100

Fig. 1: Placenta of hypertensive disorder

Fetal Parameters

Out of 30 study group, 46.43% were male babies and 53.57% were female babies. In normal, 36.68% were male babies and 63.33% were female babies. Fetal variables with the measurements are shown in Table 2.

Gestational age, birth weight, length of the baby were lesser in hypertensive group than the normal and it was statistically significant ($p<0.05$).

Placental Parameters

Placental morphometric and morphological measurements are shown in Table 3.

Placental weight, volume and the number of cotyledons were lesser in hypertensive group than the normal and it was statistically significant $p<0.05$.

Eccenteric, marginal, velamentous cord attachment (Figure 3) were more in hypertensive group than the normal and central attachment was lesser in hypertensive group than the normal.

Circummarginate and circumvallate attachment of the membrane were more in hypertensive group than the normal.

Morphological changes of the placenta

In this study, one placenta in the hypertensive group showed bilobed placenta (Figure 2). Infarction and calcium salts deposition were more in hypertensive pregnancy compared to normal pregnancy.

Fetoplacental weight ratio (FP)

FP ratio was 6.02:1 in normal group and 6.57:1 in hypertensive group.

Fig. 2: Bilobed placenta

Fig. 3: Velamentous cord attachment

Table 2: Showing distribution of fetal variables

S. No.	Variables of fetus	Normal group Mean	SD	Hypertensive group Mean	SD	Significance (p<0.005)
1	Gestational age (in weeks)	39.11	1.14	37.93	2.18	p=.003189
2	Birth weight of the baby (in gms)	2906.65	307.50	2668	455.78	p=.007175
3	Length of the baby (in cm)	49.97	2.37	48	3.63	p=.013981

Table 3: Showing distribution of placental morphometric and morphological measurements

S. No.	Variables of placenta	Normal group Mean	SD	Hypertensive group Mean	SD	Significance (p<0.005)
1	Weight of placenta (in gms)	482.63	83.80	405.78	75.13	p=.000151
2	Volume of the placenta (in ml)	466.76	76.92	401.79	76.85	p=.000637
3	Number of cotyledons	22.37	4.94	19.39	3.78	p= .006662
4	Attachment of cord	Central=16.67% Eccenteric=66.67% Marginal=13.33% Velamentous=3.33%		Central=3.33% Eccenteric=73.33% Marginal=16.67% Velamentous=6.67%		
5	Membrane attachment	Membranous=86.67% Circummarginate=6.67% Circumvallate= 6.67%		Membranous=63.33% Circummarginate=16.67% Circumvallate= 20%		
6	Infarction and calcified area	No infarction and calcium salts=66.67% Infarction and calcium salts=33.33%		No infarction and calcium salts=60% Infarction and calcium salts=40%		

Discussion

In the present study, we collected 60 placentae. Out of them, 30 were from normal pregnancy and remaining 30 were from pregnancy with hypertensive disorders. Out of 30 hypertensive cases, 15 were from gestational hypertension, 12 were from pre-eclampsia and 3 were from eclampsia. In this study, statistically significant ($p<0.05$) difference in the age of the mother was observed between the control (23.81 ± 2.24) and study group (26.11 ± 5.06). In hypertensive group, incidence of C/S was more than control. Similar results were found in a study done by Singh S et al. [4]. In our study, placental parameters like weight, volume were significantly reduced in hypertensive group compared to normal ($p<0.05$). Similar results were observed by Gowda P et al. [5], Majumdar S et al. [6], Londhe PS et al. [7], Keche HA et al. [8] and Goswami PR et al. [9]. The number of cotyledons was significantly reduced in hypertensive group. Singh S et al. [4] and Londhe PS [7] also reported a reduction of cotyledons in hypertensive disorder. The hypertensive disorder may affect the growth of stem villous of the placenta which corresponds to cotyledons [5]. Attachment of the cord was more eccentric, marginal and velamentous in hypertensive disorders than the normal. But the central attachment was lesser in hypertensive group than in the normal group. Goswami PR et al. reported more eccentric and marginal, and less central attachment of cord in hypertensive disorder [9]. Majumdar S et al. reported more marginal cord attachment in hypertensive disorder [6]. In another study, the cord was more eccentric in hypertensive disorder [10]. In our study, membrane attachment of the placenta was more circumvallate, circummarginate and less membranous in hypertensive group as compared to normal group. Infarction and calcified areas were more in hypertensive pregnancies compared to normal pregnancies. Singh S et al. [4], Ranga MK et al. [11], Gowda P [5], Londhe PS et al. [7] and Goswami PR et al. [9] observed similar features in their study. We also observed bilobed placenta in hypertensive disorder. In the present study, fetoplacental weight ratio was more in hypertensive disorder. Similar observations were made by Majumdar S et al. [6] and Gowda P et al. [5], while other studies reported decreased fetoplacental ratio [7,8,12].

The gestational age of normal and hypertensive groups was statistically significant ($p<0.05$) in this study. The mean gestational age in hypertensive group was 37.93 ± 2.18 and in normal group, it was 39.11 ± 1.14 which showed the difference in two groups. The birth weight of the fetus was reduced significantly in hypertensive group compared to

normal group. Earlier studies also reported similar findings [4,5,7,8,11,12]. We also observed a reduction in the length of the fetus in hypertensive group than normal group, which was statistically significant ($p<0.05$). In our study, we observed that there is a reduction in the placental morphometry and morphology, and also a reduction in fetal weight and length. With the help of these observations we can say that hypertensive disorders affect placental morphology and its function, thereby reducing the fetal growth, thus increasing the maternal and fetal morbidity and mortality.

Conclusion

In the present study, we observed the morphology and morphometry of placentae and fetal parameters in normal and hypertensive pregnancies. There was a significant reduction in placental morphometry and fetal parameters. Knowledge of placental and fetal insufficiencies in hypertensive disorder can help to manage and improve the antenatal care for future pregnancy and also in the management of fetus and mother after delivery.

Key Messages

Hypertensive disorders affect placental morphology and its function, thereby reducing the fetal growth, thus increasing the maternal and fetal morbidity and mortality.

Source(s) of Support: Nil

Presentation at a meeting: Nil

Conflicting Interest: Nil

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Review Article

Indian Journal of Anatomy
Volume 7 Number 4, July - August 2018
DOI: http://dx.doi.org/10.21088/ija.2320.0022.7418.17

Importance of Anatomy Act & Body Donation in Teaching and Learning of Medical Study

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Abstract

Anatomical act means act for supply of unclaimed dead body to authorized medical teaching institute for purpose of dissection and to knowing internal structure of human body because anatomy teaching become perfect by the dissection of the dead body. Anatomical act also related with body donation (donated body itself in living state) body donation is defined as act of giving body after death for medical education and research purpose. Cadavers/donated bodies form a principle teaching tools for anatomist and to teach gross anatomy. Practicing of surgical step over cadaver prior to operating a living patient is a good mode in surgical operation. In this article source of unclaimed body, anatomy act rules and regulation regarding handling of unclaimed body are discussed

Keywords: Anatomy; Anatomy Act; Body Donation; Unclaimed Body; Cadaver.

Introduction

Anatomy act 1832 (2 & 3 will. IV C.75) is an act of parliament of the united kingdom that gave free license to doctors, teachers of anatomy and bonafied medical students to dissect donated bodies. It was enacted in response to public revulsion act illegal trained corpses.

Anatomical act in Indian context – in India anatomy act was enacted in 1949 (29 September 1949).

In this act - anatomy means human anatomy, body means a dead human body, teacher of medicine means and includes any person who is employed or engaged as a professor or teacher of anatomy, pathology, medicine, surgery of obstetrics in any college of anatomy established under this act. This act have been uniformly adopted in all state of India.

Anatomy – means – by cutting human body we deal with internal structure of body

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Received | 22.04.2018, **Accepted** | 05.05.2018

Cutting of human body- means – *dissection*

Dissecting of cadaver is base for teaching of anatomy.

In ancient India S*usrut* [1] dissect human bodies. Exact knowledge of internal structure of human body obtained only through dissection of dead body.

In past there is very few medical college. But with time medical institution increase in India. So demand of cadavers for dissection increase.

So for fulfill demand of cadaver in medical institute anatomical act passed/declared by various state of India.

Most person even medicos are not aware to the anatomical act, its legal process, rules and regulation. So by this article we are just trying to set forth of anatomical act to all.

History

Anatomical act is act of state level end published in the state government gazette.

In India anatomical act was first enacted in 1948 in Maharashtra (Bombay anatomical act 1949)[2].

According to act if death are occurs in a state hospital or public place within the prescribed zone of medical college, then dead body is collected for medical college (for teaching purpose).

If police found any unclaimed body and if up to 48 hours no one claimed for this body then this body handover to medical college for teaching.

Delhi anatomical act (1953) [3] proved for supply unclaimed body of diseases person to medical teaching institute for purpose of anatomical examination and dissection. It also provides a procedure for disposal of unclaimed bodies .this section shall come in to force at once.

The Punjab anatomical act (1963) [4] passed for supply of bodies. According to this act unclaimed dead bodies in hospital, prisons, public places could be used for teach in medical institute.

Mysore anatomical act (1957) which amendment as Karnataka anatomy act [5] in 1998 effected by Karnataka state defined unclaimed body .

Gujarat anatomical act – 6 April 2011.

Now a days Maharashtra anatomical act(2014) taken as reference in all the state .

Anatomical act applied for–

1. Supply of unclaimed bodies for appropriate institution.
2. Body donation by a person before death to the medical institution for teaching and research purpose .

Unclaimed body

Means body of a deceased person who dies in a hospital prison, public place, whose body has not be claimed by any near relative/ friends with in prescribed time period.

Near Relative

Means any of following relative of deceased namely wife /husband, parents, son, daughters, brothers or sisters and included any other person who is related to the deceased

1. by linear consanguinity with in three degree
2. or by collateral consanguinity with in six degree, or
3. by marriage with any of the relative aforesaid.

Linear consanguinity & collateral consanguinity assigned in Indian succession act 1925 and degree of relationship shall be computed in manner laid down in that act.

Approved institution

Means a hospital or a medical teaching institute approved by state government.

Authorized officer (known as coroner)

Authorized officer is government officer who confirm and certified death of an individual with in a jurisdiction.

A coroner also conduct or give order to an investigation for manners and cause of death.

When patient dies under treatment in government hospital then authority in charge of hospital should report the death to authorized officer/ coroner to that area.

If a prisoner dies in a prison then authorities in charge of prisons should report the death to coroner of that area and hand over unclaimed body to approved institution authority. When any unclaimed body found in any place the authorized officer can hand over this body to medical teaching institute. In any suspicious death/murder/ poisoning/suicidal/hanging authorized officer self forward unclaimed body to police officer of court of criminal procedure.

If there is any doubt that person who claimed are relative/family member of dead body telling lie then authorized officer should referred to this case to the executive magistrate. And his decision will be final if such decision take time then authorized office would be responsible for take care and preservation of dead body from decay or destroy.

If any person orally or in writing has express request of body donation in his/her last time period of illness or at time of death in presence of two or more witness then after his/her death, dead body shall be donated to medical institute according to as his/her will.

Death certificate (which state cause of death) signed by registered medical practitioner attending the deceased or registered medical practitioner who called after the death of deceased person is necessary. Death certificate always should be delivered along with dead body to authority in-charge of an approved institute. Without death certificate authority in charge will refused to take dead body in his institute.

The authority in charge of that institution on receiving dead body, with in 24 hours transmit a copy of such certificate (body donation certificate) to the executive magistrate or officer appointed and give in writing details of date, time, place when and where dead body was received, date and place of death, name, age, gender of body.

Any dead body if exhaled from anatomical examination due to any cause then under anatomical act dead body placed in a coffin and

criminated. A certificate of crimination should be transmitted to executive magistrate or officer in charge.

Any person if no follow rules of anatomical act should be punished with fine up to rate 500. Or officer and servants of police,medical and public health department, employee of local officer shall be bound to take all responsibility to assist the authority and officer authorized under this act. All officer authorized to under this act shall be considered as public-servant.

Discussion

How a Institute Registered under Anatomical Act

1. Institution should be a CCIM, AYUSH approved, government recognized and affiliated by university for medical study.
2. Such institute may be educational or a research center.
3. Curriculum of study should have dissection part or requirement of a dead body for study.
4. They should apply for permission of anatomical act to the secretary and director of state government under medical education and drug department.
5. A notification is passed to institution by government that declared approval for anatomical act of that institution (Medical teaching or research center).
6. Institution should take no objection certificate (NOC) from civil surgeon and medical health officer or municipality and police commissioner.
7. This government notification should be published in state government gazette.
8. After publishing government notification in state government gazette, institution (Medical teaching or research center) should try to approach for demand of dead body to coroner court with undertaking that body will used for study purpose.

Importance of Anatomical act

As there were number of medical college increases, demand of unclaimed body increase day by day. It is very necessary to maintain/enacted anatomical act at national level to fulfill the demand of (unclaimed) body in medical teaching institution or research center by which there teaching quality and research work get improved. Unless institution have a legal permission of anatomical act by a government authority none institution can give permission to student for dissect a dead body for study/research purpose. In that case it is an offence to dissect or use a dead body.

Due to anatomical act unclaimed bodies are used legally in medical institute and after dissection/used body are criminated properly according to social and religious costumes. But burial dead body in a dump pit should be preferred because by this we collect bones of dead body after some months which will be used in anatomy study .

Body Donation and Anatomical Act

Body donation is a generous and unselfish act for those who wish to be usefull to the living after death[7]. Donor will help medical student learning and research [8].

Patnik (2002) suggested that one should have the habbit of donation voluntary the body after death. Voluntary donation of body is not much different from donation of organ (eye/kidney/live). Only a wish is needed. Decision of any individual to donate his / her body for anatomical examination is a vital contribution toward understanding and advancement of medical science.

Peoples should have a motivation to donate there body after death. According to anatomical act registration of individual for their will of self body donation is must prior to his/her death. Willingness form *(body donation form)* available at approved institution or college.

Body can be donated even if 'willingness form' is not filled prior to death ,according to wish of person getting die, his/her family member can donate after written consent of them.

Body now preserved by embalming procedure and kept in a preservative formalin (most commonly) in a registered institute under anatomical act.

In the institution body is used for study purpose under all legal rules, regulation and ethics related to anatomical act. After using of dead body incriminated or worried in a dump pit for a purpose of collection of bones (skeleton) for anatomy study.

Body Unacceptable for An Anatomical Donation

1. Extreme obesity
2. Autopsied body
3. Decomposed body

4. Extreme emaciation
5. Death from contagious or communicable disease eg. HIV,
6. Suicide or homicide
7. Removal of organs and tissue (except for eye/ corneal donation).

Acceptances or rejection of a dead body is a decision make at time of donation by medical institution authority. Under the law institution have right to reject a body donation for any reason.

Importance of body donation

For student and researcher body donation has proved as a great opportunity to study the human body. Computer program, text book can not replicate the hands- on methods of teaching human anatomy. In teaching of human anatomy no substitute for human body, learning through dissection of human cadaver is far superior and very different that the learning by text book/computer program. The use of human body in medical education and research is in tradition since a very old time and represent a foundation of operative surgery.

Factors responsible for donor's attitude towards body donation

Fennell and Jones (1992) reported that the most common reason for making the body cadaver is a very useful aid in medical science and gratitude to medical profession.

Sanner(1997) in a study concluded that if one is prepared to give body with in live , then another family/society member is also mentally prepared to give body after his death. The anxiety of disrespectful behavior towards cadaver was one of the reason for not donating bodies.

In a study *Golchet et al.(2000)* reported that many factors such as age, religion/culture/personality/ views related to death and mortality, humanitarian concerns influence people's openion toward body donation. *Boulware et al. (2004)* concluded that demographic and attitudinal factors were strongly related to willingness to whole body donation.

Sechirli et al. (2004) reported that although anatomists encourage body donation, but the attitude of anatomist toward donating their own bodies for dissection is negative.

Conesa et al. (2004) [9] studied influence of mass media–Television, press, magazines, radio, campaign about body donation information given by health/ medical professionals extra etc toward body donation creates a positive mentality toward body donation in general public.

Cantarovich (2005) [10] studies that lack of awareness, religious uncertainties are most common factor due to which people cannot donate body. Government should encourage and promote voluntary donation of dead bodies. For this maximum awareness and education propagated in to general people. Importance and reward give who donate their body.

Conclusion

Anatomical act help in fulfill the increasing demand of cadavers in medical teaching institution and research centers . By dissection on cadaver medical student learn anatomy and they become perfect surgeon by practicing surgical step on cadaver, prior to surgery on living .

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Case Report

Indian Journal of Anatomy
Volume 7 Number 4, July - August 2018
DOI: http://dx.doi.org/10.21088/ija.2320.0022.7418.18

Hiatal Hernia: A Case Report

Sanjana Reddy Kutur[1], Mrudula Chandrupatla[2]

Abstract

The gastro esophageal junction is the point at which the distal end of the esophagus meets the cardiac part of the stomach. The anatomy of the gastro esophageal junction is important as it lies in the proximity of the diaphragm and is present at the junction of the thorax and abdomen. Hiatal hernia is a clinical condition in which there is protrusion of the gastro esophageal junction into the thorax through the diaphragm. Obesity, coughing, straining during bowel movements, smoking are the risk factors, which may lead to hiatal hernia. The study and diagnosis of hiatal hernia is important as most of these hernias are asymptomatic and in severe conditions it can be life threatening.

Keywords: Hiatal Hernia; Esophageal Hiatus; Fundus of Stomach.

Introduction

The stomach is the widest part of the alimentary tract and lies between the esophagus and the duodenum. It is situated in the upper abdomen extending from the left upper quadrant downwards, forwards and to the right. It lies in the left hypochondriac, epigastric and umbilical areas. It occupies a recess beneath the diaphragm and anterior abdom inal wall that is bounded by upper abdominal viscera on either side [1].

The diaphragm is a muscular partition present between the thoracic and the abdominal cavity. It consists of right and left domes (cupolae) and a central tendinous part. It is a chief muscle of respiration. Contraction of the diaphragm increases the intra abdominal pressure and assists in expulsive actions like sneezing, coughing, laughing, urinating, defecating and expelling the fetus from the uterus. Abdominal organs usually the stomach may herniate into the thorax through the diaphragm. Hiatal hernia is a condition in which the stomach bulges into the thoracic cavity through the opening in the diaphragm called esophageal hiatus. Concomitant laxity of the phreno-esophageal membrane allows the gastro-esophageal junction to slide into the thorax; this is termed as sliding or type I, hiatus hernia. Sliding hernias are usually acquired. They commonly occur in the fifth decade of life and are found in more than 50% of the patients with gastro-esophageal reflux, a condition that induces tonic contraction of the longitudinal esophageal muscle, which further exacerbates the hiatus hernia. When the stomach herniates into the thorax alongside the esophagus, it is termed as Para esophageal or type II, hiatus hernia [2].

Early diagnosis of hiatus hernia is important as a delay can aggravate the situation and result in morbidity and impaired quality of life. Hiatus hernia is most commonly diagnosed by endoscopy. The hernia is visible as a bulge at the gastro-esophageal junction. Barium swallow test, high-resolution manometry, pH test and gastric emptying tests are the other diagnostic tools.

Material and Method

During routine cadaveric dissection at the Apollo Institute of Medical Sciences, Hyderabad a cadaver with hiatal hernia was observed. The dissection of

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Received | 26.04.2018, **Accepted** | 05.05.2018

the thorax was done by incising the thoracic wall along the linea alba extending from the suprasternal notch to xiphoid process. The superficial fascia and fat was cleared. The rectus sheath, rectus abdominis muscle was reflected laterally to see the intercostal muscles and ribs. The ribs were cut at the lateral ends and the sternum was cut at the junction of first rib and xiphisternum, to expose the lungs and heart. Each lung was reflected laterally and the root of each lung along with the pulmonary ligament was cut. Once the lungs were removed, the bulging of the stomach into the thorax was observed. The tissue was collected and sent for histopathological examination. It was confirmed to be a case of hiatal hernia and the abnormality was noted.

Result

Among the 8 cadavers, one female cadaver about 86 years old presented hiatal hernia with the stomach bulging into the thorax through the diaphragm. The condition was carefully studied and photographs were taken.

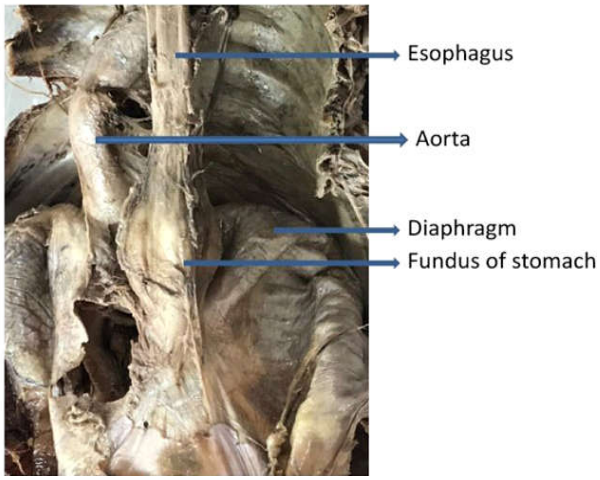

Fig. 1: Esophagus after removal of lungs

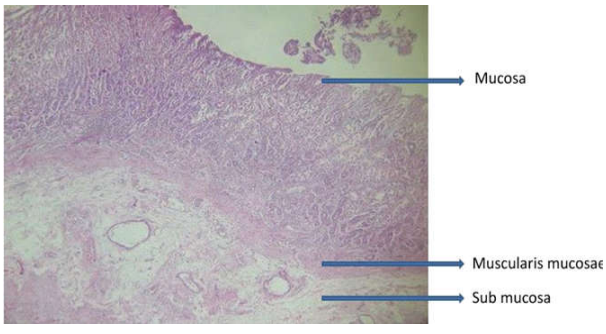

Fig. 2: Histological features

Discussion

Hiatus hernia is one of the most common disorders in people above 50 years of age. There are multiple reports and journals describing the incidence, early diagnosis and treatment for hiatal hernia.

In 2016, Supakanya Wongrakpanich; Hilit Hassidim; Wikrom Chaiwatcharayut; Wuttiporn Manatsathit, presented a case of an 88-year-old female with giant hiatal hernia. Computerized tomography of the thorax showed a large hiatal hernia containing stomach, proximal duodenum, colon and pancreas [3].

Gajendra Vikram Singh and others reported a case of a 6-year-old boy with hiatal hernia. Barium swallow study showed herniation of the gastro-esophageal junction and the entire stomach into the thorax [4].

In the year 2016, Shruti Patel and others illustrated a case of a 65-year-old Caucasian male. Computed tomography showed a large hiatal hernia containing stomach, duodenum and most of the body and tail of the pancreas [5].

Eesha R. Sachdeva and others presented a case of an 85-year-old woman with a history of hypertension, hyperlipidemia and recently diagnosed GERD. The CT scan revealed her entire stomach herniating into the thoracic cavity, compressing the heart and lungs [6].

Bilal Mirza presented a case of a 25-day-old neonate suffering from hiatal hernia. The stomach was absent in the peritoneal cavity and was entirely pushed into the thorax through the hiatal opening [7].

Medina Andrade Luis Angel and others illustrated a case of an 80-year-old woman with hiatal hernia of 9 cm and the left hemi thorax occupied by stomach, colon and spleen [8].

Ali Lankarani, Radheshyam Agarwal and Manish Dhawan reported the case of an 83-year-old with hiatal hernia. CT scan showed that 2/3 of the stomach herniated into the chest in a retro cardiac fashion [9].

Conclusion

Incidence of hiatal hernias increases with age; approximately 60% of individuals aged 50 or older have a hiatal hernia [15]. Of these, 9% are symptomatic, depending on the competence of the lower esophageal sphincter (LES). 95% of these are "sliding" hiatal hernias, in which the LES protrudes above the

diaphragm along with the stomach, and only 5% are the "rolling" type (paraesophageal), in which the LES remains stationary, but the stomach protrudes above the diaphragm. It causes symptoms as severe pain in the chest or abdomen, become nauseated, are vomiting or are unable to have a bowel movement or pass wind, you may have a strangulated hernia or an obstruction, which are medical emergencies.

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[1] Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. J Oral Pathol Med 2006; 35: 540-7.

[2] Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. Acta Odontol Scand 2003; 61: 347-55.

Article in supplement or special issue

[3] Fleischer W, Reimer K. Povidone iodine antisepsis. State of the art. Dermatology 1997; 195 Suppl 2: 3-9.

Corporate (collective) author

[4] American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. J Periodontol 2000; 71: 1792-801.

Unpublished article

[5] Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure. Dent Mater 2006.

Personal author(s)

[6] Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

Chapter in book

[7] Nauntofte B, Tenovuo J, Lagerlöf F. Secretion and composition of saliva. In: Fejerskov O, Kidd EAM,

editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. p. 7-27.

No author given

[8] World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

Reference from electronic media

[9] National Statistics Online—Trends in suicide by method in England and Wales, 1979-2001. www.statistics.gov.uk/downloads/theme_health/HSQ 20.pdf (accessed Jan 24, 2005): 7-18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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