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Original Article

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Study of Transverse Diameter of Lumbar Vertebral Body and Spinal Canal in Maharashtra Region

Kamble Yallawa[*], Kulkarni Pramod[**], Mudiraj Nitin[***]

Abstract

Introduction: Various aspects of lumbar vertebrae have been studied in the past and much of work has been done on morphometry of lumbar vertebrae and spinal canal. The size and shape of the spinal canal is important in relation to occurrence of symptoms of cord or root compression, especially when spondylatic changes supervene. Methods: For the present study forty complete known sets of lumbar vertebrae (25 sets of males and 15 sets of females) were collected from anatomy department of various medical colleges in Maharashtra region. Results: The parameters taken were transverse diameter of spinal canal and that of vertebral body. With the help of these parameters canal body ratio was calculated. The mean transverse diameter of spinal canal and vertebral body showed increase from L1 to L5 in both sexes. The canal body ratio ranged between 0.53 mm to 0.59 mm in females. The mean canal body ratio was about 0.6 mm at L1, L2 and L5 and about 0.5 mm at L3 and L4 in both sexes. The ratio between transverse diameter of spinal canal and vertebral body does not seem to be constant at all lumbar levels in both sexes. The parameters showed statistically significant difference in their mean values for males and females indicating sexual dimorphism. Conclusion: The present study showed regional variations in dimensions of lumbar vertebrae thus emphasizing the need to determine the normal ranges of values for different populations. These figures could help in forensic medicine because of observed racial and regional variations.

Keywords: Lumbar Vertebrae; Spinal Canal; Transverse Diameter; Canal Body Ratio.

Introduction

The vertebral column bears the weight of the trunk and upper limbs and transmits it to the lower limbs. This weight transmission subjects the vertebral column to vertical compressive forces, magnitude of which gradually increases from cervical to lumbar regions. The lumbar part of spinal canal houses the cauda equina. The narrowing of the canal may be developmental or it may be consequence of degenerative changes from aging, injury, disease or spinal operations which can lead to compression of the nerve roots and cause low back pain [1-5].

The pioneering work of Elsberg and Dyke and later reports by Verbiest , Hink, Clark and Hopkin have established the clinical value of measurements of interpedicular distance of lumbar vertebrae in the diagnosis of narrowing of spinal canal. Since then, the size of spinal canal has aroused interest for its clinical practice. Hence it is necessary to study the spinal canal [6].

Developmental spinal stenosis can occur at different segmental levels. Once standard tables and normal ranges are established, it becomes possible to diagnose segmental canal stenosis. These figures could help in forensic medicine because of observed racial and regional variations.

Hence present study is undertaken with the aim of examining the relationship of width of vertebral body (transverse diameter) with interpedicular distance of spinal canal by calculating canal body ratio and to find out if there are any regional and sex differences in the dimensions of lumbar vertebrae in Maharashtra region.

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Materials and Methods

For the present study forty complete known sets of lumbar vertebrae (25 sets of males and 15 sets of females) were collected from anatomy department of various medical colleges in Maharashtra region. The vertebrae with abnormal external features due to trauma, degenerative changes or congenital anomalies were excluded. Measurements were made by using Electronic Digital Vernier Caliper. Following measurements were taken and Canal –Body ratio (C/B) was calculated.

1. Transverse Diameter of the Lumbar Spinal Canal:

It was measured as the transverse distance between the medial surfaces of the roots of the vertebral arch of given vertebra (Photograph 1).

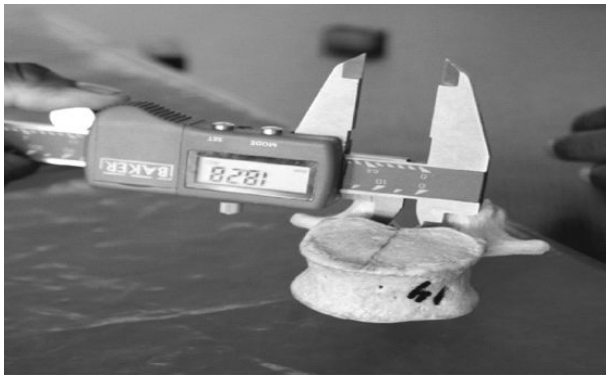

Fig. 1 Showing measurement of Transverse diameter of spinal canal

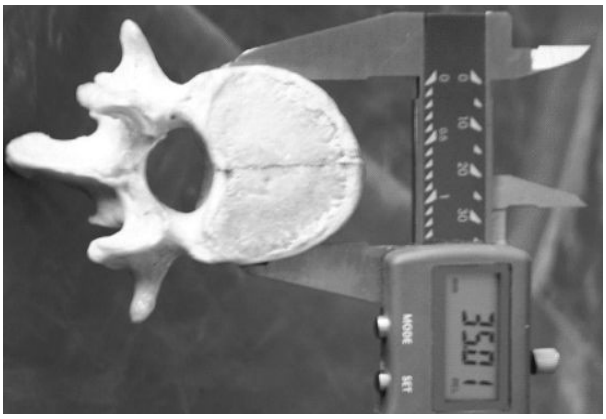

Fig. 2 Showing Measurement of Transverse Diameter of Vertebral Body

2. Transverse Diameter of the Vertebral Body

It was measured as the maximum transverse distance across the mid waist of the vertebral body (Photograph 2).

The Canal-Body Ratio (C/B) [7, 8]: It was calculated by using transverse diameter of spinal canal and corresponding vertebral body as follows.

C/B Ratio = Transverse Diameter of Spinal Canal/ Transverse Diameters of Vertebral Body. Range, mean, calculated range and standard deviation for each of measurements of lumbar vertebrae were calculated. To know whether sex plays any statistically significant difference in parameters, paired *t* test is used and *p* values were calculated for each parameter in males as well as in females.

Table 1 Shows Mean transverse diameter of spinal canal (mm)

Level	Sex	Mean	Standard Deviation	Calculated Range ±3S.D	t	P Value	Significance
L_1	M	20.63	1.198	17-24	2.880	0.008	Highly Significant
	F	19.38	1.399	15-23			
L_2	M	21.10	1.075	18-24	3.779	0.001	Highly Significant
	F	19.65	1.226	16-23			
L_3	M	21.27	2.083	15-27	2.263	0.030	Significant
	F	19.85	1.816	14-25			
L_4	M	22.23	1.645	17-27	2.728	0.010	Highly Significant
	F	20.95	1.284	17-24			
L_5	M	24.87	2.463	17-32	1.063	0.296	Not Significant
	F	24.02	2.419	16-31			

(If P<0.001 -Highly Significant, P<0.05- Significant, P>0.05 - Not Significant)

Table 2: Shows the values (mm) suggestive of spinal canal stenosis and intraspinal space occupying lesion

Transverse Diameter of Spinal Canal(mm)			
Level	Sex	Suggestive of spinal canal stenosis	Suggestive of intraspinal space occupying lesion
L_1	Male	< 17.03	>24.22
	Female	< 15.18	>23.57
L_2	Male	< 17.86	>24.32
	Female	< 15.97	>23.32
L_3	Male	< 15.02	>27.52
	Female	< 14.40	>25.30
L_4	Male	< 17.29	>27.16
	Female	<17.10	>24.80
L_5	Male	< 17.48	>32.25
	Female	< 16.76	>31.28

Results

Parameters were studied and analysis was done. Analyzed data was tabulated in tables.

The mean values of transverse diameter of spinal canal gradually increased from L_1 to L_5 in both sexes. The values were more in males than females. The difference was statistically significant for males and females at L_1 to L_4 vertebra.

Considering the calculated range of transverse diameter of spinal canal, values less than lower limits of calculated range are suggestive of spinal canal stenosis, similarly the values more than the upper limits of calculated range are of suggestive of intraspinal space occupying lesions. [9].

The transverse diameter of vertebral body gradually increased from L_1 to L_5 in both sexes. The values were more in males than females. The differences between the means of the two were statistically significant at L_1 and L_3 levels.

Table 3 Shows Mean transverse diameter of vertebral body (mm)

Level	Sex	Mean	Standard Deviation	Calculated Range ± 3S.D	t	P Value	Significance
L_1	Male	35.53	3.684	24-46	2.165	0.038	Significant
	Female	32.98	3.566	22-43			
L_2	Male	36.89	3.282	27-46	1.839	0.076	Not Significant
	Female	34.84	3.488	24-45			
L_3	Male	39.67	4.653	26-54	2.331	0.025	Significant
	Female	36.78	3.179	27-46			
L_4	Male	41.64	3.930	30-53	1.793	0.081	Not Significant
	Female	39.67	2.993	30-48			
L_5	Male	44.51	3.774	33-55	1.676	0.105	Not Significant
	Female	42.30	4.217	30-55			

(If P<0.001 -Highly Significant, P<0.05- Significant, P>0.05 - Not Significant)

Table 4 Shows Canal body ratio of present Study

Level	Sex	Mean Transverse Diameter of Spinal Canal	Mean Transverse Diameter of Vertebral Body	Canal-Body Ratio
L_1	Male	20.63	35.53	0.58
	Female	19.38	32.98	0.59
L_2	Male	21.10	36.89	0.57
	Female	19.65	34.84	0.56
L_3	Male	21.27	39.67	0.54
	Female	19.85	36.78	0.54
L_4	Male	22.23	41.64	0.53
	Female	20.95	39.67	0.53
L_5	Male	24.87	44.51	0.56
	Female	24.02	42.30	0.57

The mean canal body ratio was about 0.6 mm at L_1, L_2 and L_5 and about 0.5 mm at L_3 and L_4 in both sexes.

Discussion

The shape of lumbar vertebral canal varies from oval to triangular. The lumbar spinal canal contains conus medullaris and cauda equina within dural sac as well as epidural vessels with variable amount of fat outside the dura. The bony wall of canal is unyielding and there is normally certain minimal free space between the canal and contents. This space allows for the free movement of contents of canal without tension or pressure during these movements. Therefore, the normal size of canal is important.

Table 5 Shows Comparison of mean of transverse diameter of spinal canal in both Sexes of present study with previous data (mm)

Authors	Sex	N	Level				
			L_1	L_2	L_3	L_4	L_5
Eisenstein 1977[3] South African Caucasoid	M	78	23	24	23	24	26
	F	35	22	22	23	23	25
Eisenstein 1977 [3] Zulus	M	108	21	22	22	23	26
	F	54	20	21	21	22	24
Eisenstein 1977 [3] Sotho Negroid	M	106	21	21	22	23	25
	F	62	20	20	21	22	24
Jadhav 2013[9] Western Maharashtra	M	44	22.16	22.66	23.66	24.78	27.03
	F	40	19.84	20.16	21.59	23.09	25.47
Present Study	M	25	20.63	21.10	21.27	22.23	24.87
	F	15	19.38	19.65	19.85	20.96	24.02

An abnormal reduction in the size of the canal could predispose the individual to lower back pain.

Various causes have been attributed to low backache, but lumbar spinal canal stenosis as a causative factor in lumbar stenosis especially in the extent to which the cauda equina may be compressed within the lumbar spinal canal by constriction or narrowing of the bony ring of the canal, in contract to impingement by soft tissue [10].

Clinical value of spinal canal measurements is twofold. First, expanding intraspinal masses which enlarge the spinal canal can be detected. Second, bony encroachment upon the spinal canal can be diagnosed. The first recognizable example of lumbar spinal stenosis is provided by the Greek God Hephaestus who was having Achondroplasia limped as a result of trauma to an already narrowed spinal canal [9, 11 and 12].

Transverse diameter of spinal canal

The transverse diameter of spinal canal increased from L_1 to L_5 levels. Similar findings were observed in previous studies also. In the present study, the mean values of transverse diameter of spinal canal in females were comparable with other studies in western Maharashtra population and Sotho Negroid females [3,9], but the values in males differed slightly.

Transverse diameter of vertebral body

In the present study we found steady increase in transverse diameter of vertebral body. Widest transverse diameter was at L_5 and narrowest at L_1 in both sexes. The findings were similar to previous studies; however, the values of this parameter were less than the previous studies.

It was also seen that dimensions of vertebral body were larger in males than in females. The transverse growth of vertebral body is dependent on masculinity to some extent. This fact contributes to larger transverse diameters of vertebral bodies in males, who are more muscular than females [9].

Canal body ratio

The size of vertebral body is proportionate with build of individual. To find out the relationship between canal and body size of vertebra, the canal body ratio was calculated.

Table 6 Shows Comparison of mean transverse diameter of vertebral body in males and females of present study with previous data (mm)

Authors	Sex	N	Level				
			L_1	L_2	L_3	L_4	L_5
Eisenstein 1977 SouthAfrican Caucasoid[3]	M	78	39	40	43	44	46
	F	35	34	35	37	39	42
Eisenstein 1977 Zulus[3]	M	108	39	40	42	44	45
	F	54	35	37	38	41	43
Eisenstein 1977 Sotho Negroid [3]	M	106	38	39	41	43	44
	F	62	34	36	38	40	42
Jadhav2013 Western Maharashtra [9]	M	44	36.19	38.09	40.19	42.44	45.44
	F	40	33.34	35.22	37.16	39.69	41.84
Present Study	M	25	35.53	36.89	39.67	41.64	44.52
	F	15	32.98	34.84	36.78	39.67	42.30

Correlation between the width of lumbar vertebral canal and that of vertebral bodies showed a positive relation, here interpedicular diameter proportionally increased with transverse diameter of the body. This relation is so steady that the ratio between the two was found to be constant about 0.6 at L_1, L_2 and L_5. At L_3 and L_4 the ratios are different and both are equal, being about 0.5 in both sexes and this signifies that at these two levels (L_3 and L_4) the vertebral bodies are larger than the canal and are thus susceptible to stenosis [13].

The ratios of the present study were comparable with that of Jadhav [9] at L_1, L_2 and L_5 in both sexes where as for L_3 and L_4 they were lower [9]. When compared with the study by Devi [4], the present study showed higher values. The reasons for these differences are not clear, but interplay of racial, ethnic and environmental factors cannot be ruled out. Calculation of canal body ratio for different segments can also help in specifying whether individual measurements of spinal canal are within the normal limit for respective body size or not, thus helping to identify stenosis or dilatation of spinal canal[1,14-16].

Table 7 Shows Comparison of canal body ratio of present study with previous study

Level	Authors				
	Devi 2003 South Indian [4]	Jadhav2013 Western Maharashtra [9]		Present Study	
		Male	Female	Male	Female
L1	0.52	0.61	0.59	0.58	0.59
L2	0.49	0.60	0.57	0.57	0.56
L3	0.48	0.59	0.58	0.54	0.54
L4	0.49	0.59	0.58	0.53	0.53
L5	0.53	0.60	0.61	0.56	0.57

There are considerable variations in transverse diameter of vertebral body and spinal canal between different races. Variations can occur in relation to general somatic size within a population. But transverse diameter of the spinal canal at any segmental level is proportional to the width of the vertebral body at that level [1, 14]. The obvious differences in canal size of various studied groups emphasize the need to compile tables applicable to a particular group.

Conclusion

In the present study transverse diameter of spinal canal and vertebral body and canal body ratio were studied. Transverse diameter of spinal canal and vertebral body showed statistically significant difference in their mean values for males and females indicating sexual dimorphism. The canal body ratio was not constant for L_1 to L_5 vertebral levels in both sexes. The present study also showed regional variations in dimensions of lumbar vertebrae thus emphasizing the need to determine the normal ranges of values for different populations. These figures could help in forensic medicine because of observed racial and regional variations.

Furthermore study of these parameters can be useful in detection of clinical conditions like spinal canal stenosis and some cases of intraspinal tumors etc.

Abbreviations used

1. S.D.-Standard Deviation
2. P-Probability or level of significance for difference between two means.
3. M -Male
4. F- Female
5. N-Total number of sample size

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Original Article

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Assessment of Gestational Age of Fetus by Real Time Ultra Sonographic Measurement of Placental Thickness

Natwar L. Agrawal*

Abstract

Aim: The study was conducted with the aim of evaluating the placental thickness, as a parameter for estimating gestational age of the fetus. *Materials & Methods :* This study consists of 100 pregnant females, between 13th to 39th weeks gestation with their age ranging from 18 -35 years, attending antenatal clinic at the department of Obstetrics and gynecology, Pt.J.N.M. Medical College & Dr. B.R. Ambedkar Memorial Hospital Raipur (C.G.) from October 2008 to august 2009. USG was done by using Gray scale real time(LOGIQ 400) machine employing a 3.5 MHz convex transducer. After estimating the fetal age by BPD, HC, AC, and FL the placental thickness (PT) was measured perpendicular to the basal and chorionic plates, in the mid portion of the placenta at the level of insertion of umbilical cord. *Results:* It was observed that the placental thickness gradually increased from 16 mm at 15 weeks of gestation to 37 mm at 39 weeks. From 23rd week to the 34th of gestation the placental thickness coincide almost exactly with the gestational age in weeks. *Conclusion:* To conclude, the measurement of the placental thickness is an important parameter for estimation of fetal age along with other parameters especially in the late mid trimester and early third trimester, where the exact duration of pregnancy is not known.

Key words: Placenta; Gestational Age; Placental Thickness; Fetal Maturity.

Introduction

The physiological link between a pregnant woman and the fetus is provided by a fetal organ known as the placenta. Its main functions are exchange of metabolic and gaseous products between maternal and fetal bloodstreams, and production of hormones [1]. It is a highly vascularized organ having composite development i.e., partially from maternal tissue and partially by fetal cells. The placenta develops from the chorionic villi at the implantation site at about the fifth week of gestation. Placental formation begins in the latter-half of the 2nd month of the pregnancy and is usually completed by the 4th month. It reaches its maximum growth at term [2].

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Ultra-sonographic assessment has advanced obstetric practice by enabling relatively detailed assessment of the fetus in utero, including an accurate estimate of gestational age. By the ninth or tenth week the diffuse granular echotexture of the placenta is clearly apparent at sonography. Placental thickness appears to be a promising parameter for estimation of gestational age of fetus. Placental thickness can be measured at the level of the umbilical cord insertion. Gestation is the period between conception and birth of a baby, during which the fetus grows and develops inside the mother's uterus. Gestational age is the time measured from the first day of the woman's last menstrual cycle to the current date and is measured in weeks. This is because of increase in placental thickness with gestational age. Several studies have reported an increase in placental thickness with gestational age [3-5]. Studies by Mital et al and Anupama et al have reported the use of placental thickness as an indicator of gestational age of fetus [6,7]. Hence the present study was undertaken to investigate placental thickness as a parameter for estimating gestational age of fetus in normal singleton pregnancies using real time ultra-sonographic assessment.

Materials and method

This study was performed in Department of Anatomy in close association with the Department of Radiodiagnosis, tertiary care hospital of state medical college. This study consists of 100 pregnant females, between 13 weeks to 39 weeks gestation with their age ranging from 18 -35 years. The pregnant females with history of regular menses, known last menstrual period, singleton and viable fetus and with the ability of patient to come for follow-up at regular intervals were included. Pregnancy complicated by medical disorders such as anemia, diabetes mellitus in mother, twin pregnancy and any congenital disorders in fetus were excluded from the study.

Real time ultrasonographic scanning for placental thickness: ultrasonographic assessment was performed using a Gray scale real time machine (LOGIQ 400) employing a 3.5 MHz convex transducer. The area between the pubic symphysis and umbilicus was exposed. The ultrasonic jelly was applied uniformly to the skin and transducer's head. The anatomical plane chosen for measurement of various fetal parameters was obtained by placing the transducer over abdomen in the middle sagittal section. The fetal head was then looked for the lie of the fetus then placing the transducer over parasagittal plane to define other fetal parts. The placenta was located and placental thickness was measured perpendicular to the basal and chorionic plates, in the mid portion of the placenta at the level of insertion of umbilical cord. To interpret, the data was analyzed statistically.

Results

The mean values of placental thickness along with respective standard deviation were calculated for different gestational ages from 15th weeks to 39th week.

It was observed that the placental thickness gradually increased from approximately 16mm at 15 weeks of gestation to 37mm at 39 weeks of gestation.

In our study the placental thickness is exactly correlated with gestational age during 23rd week to 34th week of gestation, (1-3 mm) higher up to 22nd week and (1-2 mm) lower from 35th weeks onwards.[Table 1]

Table 1 Correlation between Gestational age (in weeks) and placental thickness (in mm)

Gestationalage (in wks)	No. of cases	Placental thickness in mm (mean ±SD)

The value of mean placental thickness increases with advancing gestational age almost matching from 23rd week to 34th week of gestation as shown in graph 1[Graph 1]

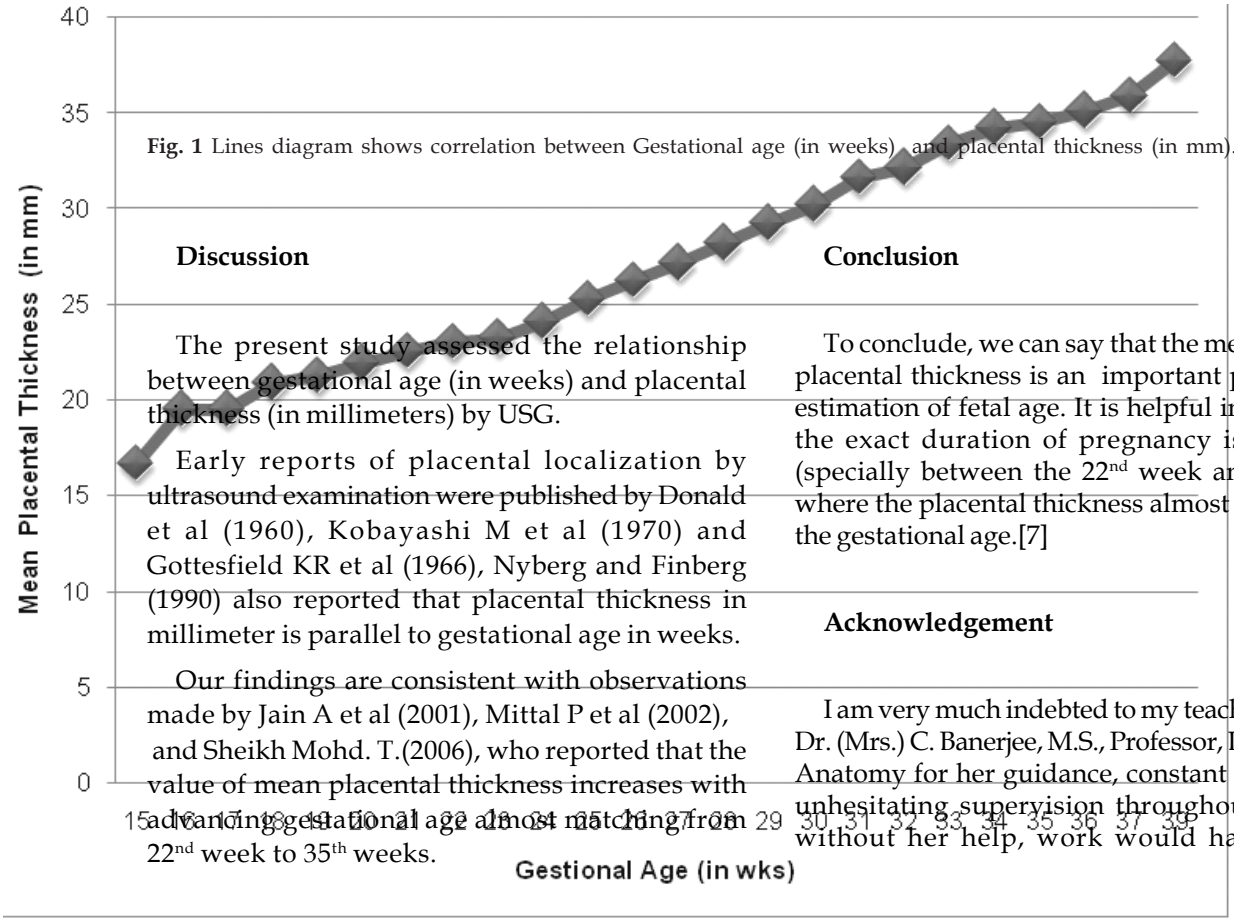

Fig. 1 Lines diagram shows correlation between Gestational age (in weeks) and placental thickness (in mm).

Discussion

The present study assessed the relationship between gestational age (in weeks) and placental thickness (in millimeters) by USG.

Early reports of placental localization by ultrasound examination were published by Donald et al (1960), Kobayashi M et al (1970) and Gottesfield KR et al (1966), Nyberg and Finberg (1990) also reported that placental thickness in millimeter is parallel to gestational age in weeks.

Our findings are consistent with observations made by Jain A et al (2001), Mittal P et al (2002), and Sheikh Mohd. T.(2006), who reported that the value of mean placental thickness increases with advancing gestational age almost matching from 22nd week to 35th weeks.

Conclusion

To conclude, we can say that the measurement of placental thickness is an important parameter for estimation of fetal age. It is helpful in cases where the exact duration of pregnancy is not known (specially between the 22nd week and 35th week) where the placental thickness almost matches with the gestational age.[7]

Acknowledgement

I am very much indebted to my teacher and guide, Dr. (Mrs.) C. Banerjee, M.S., Professor, Department of Anatomy for her guidance, constant direction and unhesitating supervision throughout this work, without her help, work would have not been

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Original Article

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Application of Multimedia Design Principle in Learning Anatomy and Physiology

Ingole A.[*], Dope Santosh kumar A.[**], Bahattare V.[***], Chaware S[****]

Abstract

The study is conducted for application of multimedia design principle as a cost effective tool for must know cardiac muscle knowledge. First MBBS Students- two groups of 20, theory lecture for group A and theory lecture with animations for group B. In MCQ of 90% of Group B shows good to excellent performance; 65% of Group A gave good to excellent performance. The student's feedback shows that lecture with the animations received good and excellent remarks. The role of teacher as a source of knowledge and role model cannot be replaced by technology. Whereas Application of multimedia design principle in learning is useful for improvement in understanding, reviewing and self-study.

Keywords: Animations; Learning; Multimedia.

Introduction

Anatomy and Physiology are pillars of medical sciences. Only memorising knowledge is useless for these subjects. The understanding knowledge is important. This subject contains designs and hypothesis. Hence imagination power is needed for understanding these subjects. Keeping this view, Video animations can help student's learning, many software for animations are available in market and internet.

The animations based learning is a dynamic form of multimedia learning. The use of information and communication technology in medical field is transforming MBBS education. Compact discs (CDs) and digital animations discs are the tools of information and communication technology[1]. In this study the traditional teaching theory lecture is compared with theory lectures with animations.

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Material and method

Context of Study

Aim: Impact of animations on Ist MBBS student's learning.

Objectives: To improve learning and increase confidence of students.

Overall goal: Application of multimedia design principle as a cost effective tool for must know cardiac muscle knowledge for Ist MBBS students.

Material

- First MBBS Students- two groups of 20.
- Group A-theory lecture for 45 minutes .
- Group B- theory lecture with animations for 45 minutes.
- Topic of theory lecture anatomy and physiology of cardiac muscle.
- Material for cardiac muscle from textbook and available software compact discs.

Method

1. Permission of the Dean, Government Medical College & Hospital, Latur.
2. Approval from the Ethical Committee.
3. Preparation of checklist for MCQ evaluation.

4. Peer review of documents.
5. Consent of all students.
6. Group A – received theory lecture followed by MCQ.
7. Group B – theory lecture with animations followed by MCQ.

Observations

1) MCQ of cardiac muscle topic performed both groups.

2) *Students feedback*- Students were guided to fill the feedback forms after the MCQ evaluation. The eight points were asked to grade as poor, average, good, excellent in all groups.

Table 1 MCQ performance

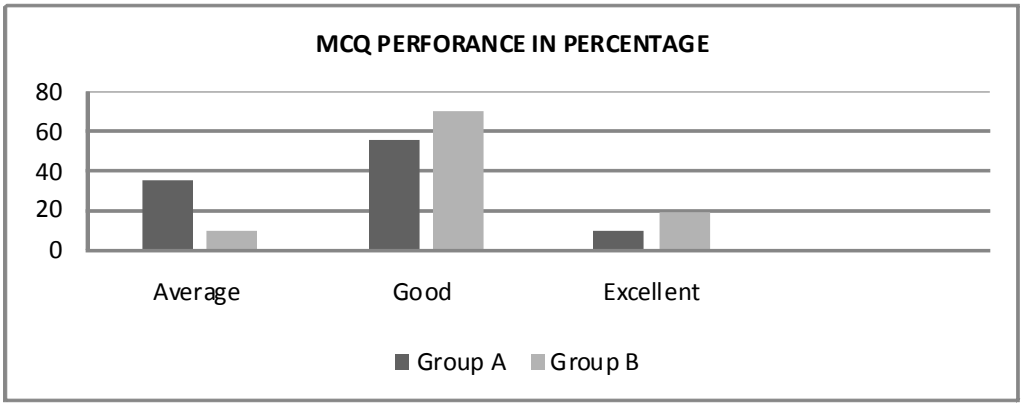


Fig. 1 MCQ Performance Vertical axis (VA)-percentage of students,Horizontal axis(HA)- grading of performance.

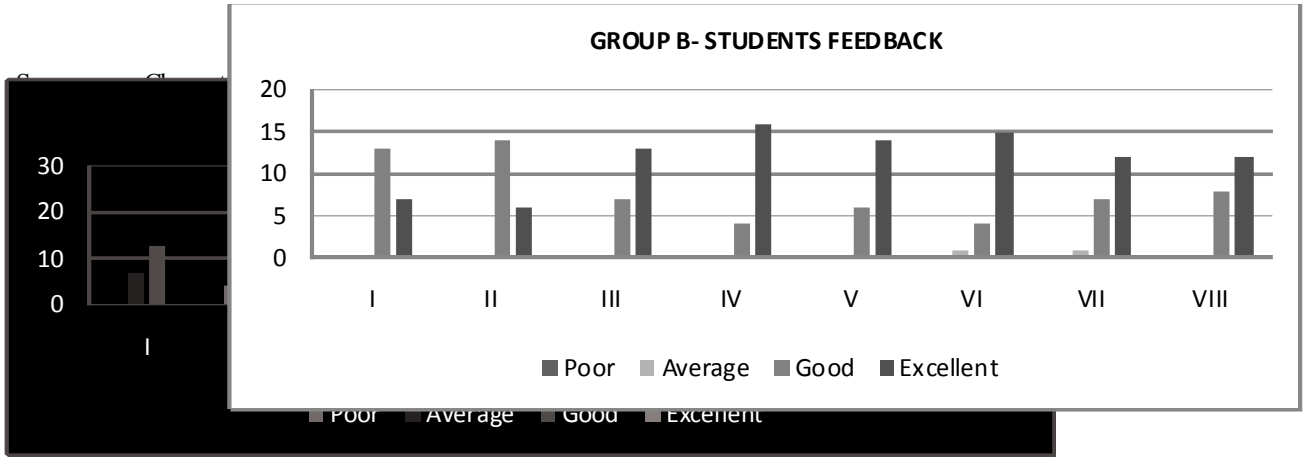
Table 2 feedback of Group A

Sr no	Charecteristic	Score-1 Poor	Score-2 Average	Score-3 Good	Score-4 Excellent
1	Understanding of all steps	0	7	13	0
2	Ability to recollect	4	6	10	0
3	Relevance of subject	0	0	18	2
4	Opportunity to review	20	0	0	0
5	Opportunity to interact	0	1	17	2
6	Content of knowledge	0	1	17	2
7	Confidence of performing	4	14	2	0
8	Satisfaction of learning	0	0	17	3

A)Best in theory lecture –student's feedback

1. Live perception of Topic.
2. Interaction with teacher.
3. Increased confidence of student.
4. Decrease fear & apprehension to learning.

Table 3 Students feedback, Group B



B)Best in Theory Lecture with animations-student's feedback

1. It shows the internal anatomical structures illustratively.
2. Cardiac musle nicely demonstrated ,visually excellent.
3. Modifications seen better.
4. Increased ability to recollect and reviewing.
5. Helps to improve confidence.
6. Interest in the subject is increased.
7. Each individual can see the field area as compared to theory lecture.
8. Better Clarity & magnification.

Evaluation

1. From Table No I, in MCQ of cardiac muscle the 90% of Group B shows good to excellent performance; 65% of Group A gave Good to excellent performance. Thus the students with both performed better than those with only theory lecture.

2. The student's feedback shows that the understanding of steps and ability to recollect the animations received good and excellent remarks. The theory lecture has the best ability to interact and

animations gives opportunity to review. Group B had more confidence of performance and satisfaction of learning. 80% students mentioned that reviewing helped in improvement of learning.

Discussion

Videos can have a strong effect on the mind and senses. Students can experience the powerful cognitive and emotional impact[2]. In a study conducted by Durham et al. (2009) on the effectiveness of video-based teaching, much less figure of 64.6% was quoted by students that watching the animations(videos) made it easier for them to put theoretical knowledge to clinical action. The use of animations was thought to have been useful for improving capabilities to deal with exams, thus attributing to MBBS education in an effective way[3]. It has been suggested that Information Communication Technology and online learning will replace many of the traditional methods of teaching. However, it could not replace the physical presence of teachers nor should it be seen as a substitute for curriculum content[4].

Conclusion

The present study shows that students with both i.e. lecture with animations were better in all aspects. Thus the combination of theory lecture and video animations is the best Teaching Learning method for the anatomy and physiology. The role of teacher as a source of knowledge and role model cannot be replaced by technology. Whereas Application of multimedia design principle in learning is useful for improvement in understanding, reviewing and self-study.

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Original Article

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3D Anatomy: Implication For Teachers

Col B. K. Mishra[*], Col Sushil Kumar[**]

Abstract

Advances in technology have gone far beyond what was possible with cadaveric material. Virtual surgery can be carried out so that surgeons can practice new techniques and see the outcome before bringing it to the patient. Anatomy teaching has progressed with the use of 3D technology to new heights. However, it is time to introspect. These techniques are very cost intensive in the short term. Are they worth it long term? What implications do they have for us as anatomy teachers?

In this paper we review the experiences of teachers using 3D methods over past few years. Various methods have been utilized; 3D graphic models, 3D Arthroscopy, 3D ultrasound, 3D videography , web-based 3D platform etc. The objective results seem to be equivocal when the results are considered *en solatario*. However, when considered *en toto* are very clear. 3D Anatomy has a definite place as teaching technology in the teacher's arsenal, along with other techniques including CHALKBOARD. But in all these articles the subjective report by the students has been indicate that teaching-learning experience is more satisfactory using technology. We teachers have to accept the challenge so that we do not fall behind the technological and also we do not swept aside by younger persons in technical fields.

Key words: Medical Education; Computer Aided Teaching; Virtual Body; 3D Reconstruction.

Introduction

Advances in technology have gone far beyond what was possible with cadaveric material. Virtual surgery can be carried out so that surgeons can practice new techniques and see the outcome before bringing it to the patient. Anatomy teaching has progressed with the use of 3D technology to new heights. However it is time to introspect. These techniques are very cost intensive in the short term. Are they worth it long term? What implications do they have for us as anatomy teachers?

Teaching is now being carried out using various technologies, including 3D graphic models, 3D Arthroscopy, 3D ultrasound, 3D videography, web-based 3D platform etc. Work done recently in various centers using these teaching methodologies and the objective results as well as subjective reactions were reviewed. The process of review threw up some important questions.

1. Are these new technologies more effective educational tools *vis a vis* the traditional methodologies?
2. Are they more effective in generating interest in learners?

The most important question is whether these technologies are effective teaching tools. The answer is equivocal as different centers have had different results

In a study on teaching neuroimaging at the University of Salamanca, Salamanca, Spain[1] they found that:

"The percentage of correct answers (hit rate) and level of confidence in responses were significantly higher in the 3D visualization condition than in the 2D. In addition, the response time was significantly lower for the 3D visualization condition in comparison with the 2D. The interaction between the experimental condition (2D vs. 3D) and difficulty was significant, and the 3D condition

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facilitated the location of difficult images more than the 2D condition. 3D volumetric visualization helps to identify brain structures such as the hippocampus and amygdala, more accurately and rapidly than conventional 2D visualization."

However in another study at the Department of Surgery, University of Heidelberg, Heidelberg, Germany[2] their result on teaching CT interpretation using 3D techniques is quite different. They have said:

"This study of 73 students showed that training on 3D presentations did not improve the ability to interpret 2D images. Further, the results revealed no significant differences between the results of Week 1 (2D: M = 6.5, SD = 1.8; 3D: M = 6.6, SD = 1.4; p > .95) and Week 2 (2D: M = 6.1, SD = 1.9; 3D: M = 6.0, SD = 1.4; p > .7). There were no significant gender differences. However, students randomized to 2D who completed only the first EP performed significantly worse if compared to students who completed both EP (p = .04). CONCLUSIONS: This randomized controlled study shows that correct interpretation of 2D imaging does not differ in students trained with either 3D or 2D."

Even using 3D Video techniques at the Department of Anatomy and Cell Biology, Schulich School of Medicine and Dentistry, The University of Western Ontario, London, Ontario, Canada[3] have found:

"Despite growing literature suggesting that 3D correlates directly to enhanced skill acquisition, this study did not differentiate significant results contributing to increased surgical performance. This topic will continue to be explored using more sensitive scales of measurement and more complex "open procedures" capitalizing on the importance of depth perception in surgical manipulation".

Because of the limitations of cadaver teaching, Codd AM, Choudhury B[4], had produced an interactive, three-dimensional computer model of human forearm anterior compartment musculoskeletal anatomy with an aim to evaluate the use of 3D virtual reality when compared with traditional anatomy teaching methods. They found the model group mean test score to be significantly higher than the control group and not significantly different to the traditional methods group. They said that: *"Feedback from all users of the e-resource was positive. Virtual reality anatomy learning can be used to compliment traditional teaching methods effectively".*

Keedy AW, Durack JC, Sandhu P, Chen EM, O'Sullivan PS, Breiman RS[5] also did a comparative study on traditional teaching methods and 3D computer models. They found that the difference in pre-test and post-test scores were not statistically significant. Spatial ability also did not statistically significantly correlate with post-test scores for the 3D group or the 2D group. However in the post-test satisfaction survey the 3D group expressed a statistically significantly higher overall satisfaction rating compared to students in the 2D control group.

Even in the dental teaching faculty Curnier F[6] had reported about teaching dentistry by Virtual Reality. His results showed that 70% of the students were satisfied or very satisfied with this module and that the simulation boosted their motivation to learn anatomy. It also became evident that it did not introduce an additional complexity that reduced teaching efficiency. They have said *"This was a clear message for us to develop a second-generation virtual reality dental simulator with improved tactile features to teach drilling procedures".*

Venail F, Deveze A, Lallemant B, Guevara N, Mondain M[7]. studied the effect of supplementing of temporal bone anatomy learning with computer 3D rendered imaging software. They have reported that generally, all participants found this new tool interesting and user-friendly for the learning of temporal bone anatomy. However, they also found that most participants also considered the help of a teacher indispensable to guide them through the virtual dissection. They concluded that: *"The 3D anatomical software, used in parallel with traditional teaching methods, such as lectures and cadaver dissection, appears to be a promising tool to improve student learning of temporal bone anatomy" .*

Coming back to the questions posed at the beginning:

1. Are these new technologies more effective Educational tools *Vis a vis* the traditional methodologies? and
2. Are they more effective in generating interest in learners?

Taking the questions one by one as far as effectiveness as educational tools is considered neither Metzler R[2] et al of the Department of Surgery, University of Heidelberg, Heidelberg, Germany or Roach VA,[3] et al of Department of Anatomy and Cell Biology, Schulich School of Medicine and Dentistry, The University of Western Ontario, Canada find any significant difference between students taught using more traditional methods and the modern technologies. Venail F[7] et al have found that most participants also considered the help of a teacher indispensable to guide them through the virtual dissection.

New strategies are therefore needed to not only make anatomy teaching more clinically integrated,

but also to implement new interactive teaching techniques to help students more efficiently grasp the complex organization of the human body. Among the difficult anatomical concepts that students struggle to understand, the anatomy of the peritoneal cavity with its complex projections of peritoneum and this could benefit strongly from new learning aids.

In a study [8] carried out in Department of Anatomy and Cell Biology, McGill University, Montreal, Quebec, Canada to implement new interactive teaching techniques to help students more efficiently grasp the layout of the mesenteries they built a model consisting of a patchwork of mesenteries and gut made from coloured cloth stitched together onto a T-shirt to denote the origin and outflow of each peritoneum projection. As the lecturer wears the life-size model, the students can appreciate the 3D organization of the peritoneal cavity on a living body.

In another study in Uruguay Rivas RD[9] prepared a multi-coloured cardboard model accompanied by a user manual which provides a thorough description for the most common vestibular diseases. They found that the model had been well received at several Latin American scientific conferences. The model is understood with verbal instruction only; nevertheless, a printed user manual was included. They concluded that this 3 dimensional (3D) cardboard model of the Semi-circular Canals (SC) was a practical, low cost tool for use in private and academic settings.

Taking the experience of these studies it is seen that technology is not the only answer. The canadian[8] and Uruguayan[9] studies demonstrate that the innovative and out of the box strategies are what is important to get the attention of the student. And once the students' attention is focused even a handkerchief becomes a teaching tool. As every teacher has experienced the tried and tested chalkboard is at present unmatched and has no close rival so far. But these newer technologies are coming up rapidly. As the studies above as well as other studies carried out in Australia[10], Grenoble, France[11] show it is easily concluded that the newer technologies of 3D graphic models, 3D Arthroscopy, 3D ultrasound, 3D videography, web-based 3D platform etc. are not only viable tools but essential tools in the arsenal of the modern anatomy teacher as technology advances.

However, experience has shown and these studies also point out a tool is only as good as the skill of the wielder. Taking into consideration the user satisfaction scores as related by Codd AM, Choudhury B[4], Keedy AW, Durack JC, Sandhu P, Chen EM, O'Sullivan PS, Breiman RS[5]. Curnier F[6] and Venail F[7] as well as the experiences in Australia[8], Uruguay[9] and Grenoble, France[11] it is time for the modern medical teacher to acquire skills in the burgeoning tools of the new technological age so that he is not overtaken by the younger generation of specialists and is able to retain the interest of the new generation techno savvy students.

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Natal Teeth : A Rare Case Report

Brijendra Singh[*], Renu Gupta[**], Dushyant Agrawal[***], Prerna Thareja[****], Ritu Singh[*****]

Abstract

Child development from conception through the birth and especially till first few years of life is marked by many milestone continuous changes. Tooth eruption follows a chronology corresponding to the date when a particular tooth erupts into the oral cavity. Teeth erupting at birth are quite rare and are referred to as natal teeth. Natal teeth may be associated with many etiologies like genetic, heredity, environmental and endocrinal or can be a part of syndromes. We are reporting here an unusual case of natal teeth without any congenital abnormality. Epidemiological, etiological, and therapeutical aspects of this developmental disturbance of teeth eruption is reviewed in order to establish guidelines for the dentist and neonatologist to manage this problem with minimal damage to the future teeth and the psychological aspects in relation to family of patient.

Key words: Natal Teeth; Eruption; Endocrinology.

Introduction

Child development from conception through the first years of life is marked by many changes which follow a particular pattern. Developmental milestone of first tooth eruption occurs at about six months of age. The expectations about the eruption of the first teeth are great [1]. The presence of teeth in newborns is quite uncommon, varying from 1:6000 to 1:800 and of two or three teeth [2]. Natal and neonatal teeth are observed at birth or during the first 30 days of life respectively. In addition to cosmetic and psychological problems, they can cause feeding problems, ulceration of the ventral part of tongue and frenulum, discomfort and ulceration to mother's breast in case of breast fed infant, loosening of natal tooth/teeth and risk of aspiration. Ninety percent of these teeth are primary. Natal teeth are associated with genetic conditions like Hallermann–Strieff syndrome, Ellis Van Creveld syndrome, pachyonychia congenital, Down's syndrome, cleft lip, cleft palate, cyclopia and some endocrinal problem like hypothyroidism [3]. We are reporting an interesting case of natal teeth in a normal infant.

Case report

A five day old healthy male infant, first baby to non-consanguineously wed parents, a normal vaginal delivery with a birth weight of 2.9 kilogram. There was no history of pathological neonatal jaundice or swelling in the neck or stridor or any respiratory distress. There was no history of difficulty in feeding or lethargy or temperature instability. The baby had passed meconium after 48 hours of life. There was no history suggestive of hypothyroidism or hyperthyroidism in the mother too. The mother was not exposed to any drug or environmental toxin known to cause any problems in the foetus. The baby was noted to have one bigger tooth and one smaller in the lower jaw from birth [Figure 1].

On examination, the baby was normothermic with cylindrical body, fine facies and well hydrated tongue and skin. The hair was coarse and blackish in colour. The anterior fontanel was of 3 x 3 cm size. The posterior fontanel was 1 x 0.5cm in size. There was no sutural separation on skull examination. There were two mandibular central incisors which were firmly attached and yellowish in colour. (There were no ulcerations in the base of the tongue nor did

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Fig. 1 photograph showing two mandibular incisor teeth of five day male child.

the mother have any soreness of nipple.) There was mild pallor but no icterus, clubbing, lymphadenopathy, or dependent oedema in the baby. Anthropometric measurements of baby revealed a length of 51 cm, weight of 2.8 kilogram, head circumference of 34.5 cm, and chest circumference of 32 cm. The infant's sitting height, measured from crown to rump, is approximately 34 cm. The upper segment to lower segment ratio was 1.67. The natal teeth were not causing any problem in feeding.

Supernumerary teeth were excluded by an oral radiograph. Hemogram revealed a hemoglobin level of 10.5 g/dl and a differential count of 68% neutrophils, 8% eosinophils, 24% lymphocyte. Peripheral smear revealed normocytic normochromic red blood cells with mild eosinophilia and few reactive lymphocytes, and adequate number of platelets. The thyroid profile revealed normal thyroid stimulating hormone (TSH) level which was 0.93 ng/ml. Neurosonogram was normal. The thyroid profile of the mother was normal.

Discussion

The presence of natal and neonatal teeth is definitely a disturbance of biological chronology whose aetiology is still unknown. It has been related to several factors, such as superficial position of the germ, infection or malnutrition, febrile states [4] eruption accelerated by febrile incidents or hormonal stimulation, hereditary transmission of a dominant autosomal gene [5] osteoblastic activity inside the germ area related to the remodelling phenomenon and hypovitaminosis [6].

In our case two mandibular incisor were present at time of birth come in category of natal teeth but aetiology of them is not known because antenatal period and delivery of mother was normal as well as mother didn't have any medical problems. On investigation child was also found to be normal, all other parameter of baby according to age were in normal range except this dentition raised question of its origin.

Although eruption of the lower deciduous incisors is normal at birth in many mammals, natal teeth are rare in humans. The incidence of natal teeth ranges from 1:2,000 to 1:3,500 live births [7]. The most commonly affected teeth are the lower primary central incisors (85%), followed by the maxillary incisors (1%), mandibular canines and molars (3%), and maxillary canines and molars (1%) [8]. The eruption of more than two natal teeth is rare. Masatomi et al. reported an infant with fourteen natal teeth [9].

The presence of natal and neonatal teeth may be a source of doubt about the future treatment plan. In the decision of maintaining or not these teeth in the oral cavity, some factors should be considered, such as implantation and degree of mobility, inconveniences during suckling, interference with breast feeding, possibility of traumatic injury, and whether the tooth is part of the normal dentition or is supernumerary [1].

If the erupted tooth is diagnosed as a tooth of the normal dentition, each of the other situations mentioned above should be considered. The maintenance of these teeth in the mouth is the first treatment option, unless this would cause injury to the baby. When well implanted, these teeth should be left in the arch and their removal should be indicated only when they interfere with feeding or when they are highly mobile, with the risk of aspiration [3]. In our case teeth were tightly implanted in socket, not mobile and not cause any problem in feeding so as per guideline no intervention was done.

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Lingual Thyroid - A Rare Clinical Entity

Kalpana V. Patil[*], Pratima Kulkarni[**], Chhaya Diwan[***],

Abstract

Lingual thyroid is a rare embryological aberration , consisting of thyroid tissue tumor mass located at the base of the tongue causing mostly local symptoms. Present case is a young female presented with swelling on back side of the tongue having dysphagia & foreign body sensation in throat. oral examination showed- a semispherical reddish tumor-like lesion with a vegetating surface.The diagnosis was based on the clinical features, FNAC (Fine Needle Aspiration Cytology) & radiographic imaging studies . Treatment includes surgical removal, transplantation, I-131, and thyroid replacement.

Keyword - Lingual Thyroid; NCCT; Dysphagia; ^{99m}Tc-Pertechnatate Thyroid Scan.

Introduction

Lingual thyroid is a rare embryological aberration with incidence of 1:100,000. The lesion consists of a tumor mass of thyroid tissue located at the base of the tongue, in the region of the foramen caecum linguae (lingual thyroid). It appears as a mass on the base of the tongue causing mostly local symptoms often with hypothyroidism, rarely with thrive and mental retardation. The pathological findings of lingual thyroid tissue are similar to that of cervical thyroid tissue, including goitre formation. The diagnosis was based on the clinical features, fine needle aspiration biopsy, laboratory tests and radiographic imaging studies . Treatment includes surgical removal, transplantation, I-131, and thyroid replacement. Lingual thyroid identification is of great significance, since it may constitute the only functional thyroid tissue in the body.

Case Report

- A 23-year-old female presented in ENT OPD with c/o swelling on back side of the tongue having dysphagia , & foreign body sensation in throat since 3 years.
- No other complaints like blood stained sputum, difficulty in breathing were present.
- Patient diagnosed as hypothyroidism 6 months back taking supplement medication since then.
- On oral cavity examination showed- a semispherical tumor-like lesion ,reddish in colour and measured approx 2.5 cm in diameter with a vegetating surface, which on palpation revealed firm consistency without any pulsation located in the posterior midline region of the back of the tongue.
- Neck examination - Revealed neither palpable thyroid gland nor any other palpable masses.

Investigations

Ultrsonograpahy of Neck revealed finding s/o non visualisation of thyroid gland at its normal location and a complex mass lesion in the posterior aspect of tongue region s/o lingual thyroid. NCCT Neck shows e/o well defined heterogeneous hyper dense lesion of 2.5 x 1.5 cm seen in relation to posterior part of tongue anterior to epiglottis. Normal thyroid gland parenchyma not seen anterior to trachea s/o lingual thyroid., Fine Needle Aspiration Cytology (FNAC) from the mass revealed normal thyroid tissue with few colloidal changes.,Thyroid function test revealed the following concentrations: T3:- 74 ng/dl T4:- 4 µg/dl TSH:- 150 µIU/ml , s/o

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Fig. 1 Photograph of oral cavity showing a semispherical tumor-like lesion.

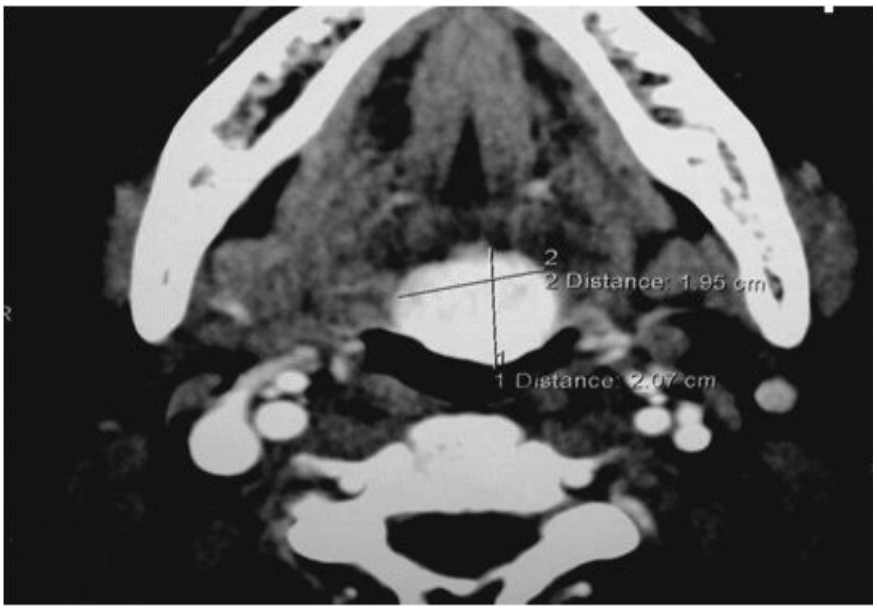

Fig. 2 Photograph of NCCT Neck showing lingual thyroid.

hypothyroid status , so supplementation treatment (levothyroxine-50 mcg/day) started and euthyroid status achieved., ^{99m}Tc-Pertechnatate Thyroid Scan : Study was completed with thyroid scintigraphy which revealed radiotracer concentration at base of tongue suggests ectopic lingual thyroid gland.

Treatment

Surgical Excision :- Patient underwent surgical excision by LASER technique under general anaesthesia by nasal intubation .

Mass excised from posterior side of tongue in total and some pieces sent for histopathological examination and remaining parts implanted in neck under SCM on both sides .

Histopathological report : post-operative day-4 confirmed normal thyroid tissue

Differential diagnosis :-

- Lingual tonsil
- Thyroglossal duct cyst
- Malignancy
- Hemangioma
- Dermoid

Discussion

Lingual thyroid is a rare developmental thyroid anomaly, caused by the failure of the gland to descend from its anlage, early in the course of embryogenesis. It generally originates from epithelial tissue of non-obliterated thyroglossal duct[1]. Clinically, LT is relatively rare, and is identified in approximately one out of every 3000 thyroid disorders , with a 4:1 predominance in females over males[2].

Although the pathogenesis of lingual thyroid is unclear, some authors have postulated that maternal antithyroid immunoglobulins may impair gland descent during early fetal life[3].

According to some authors, patients with LT remain euthyroid, while others can suffer endocrine hypofunction(33%), with the possibility of carcinomatous transformation in 1-3% of cases[2,4]. Seventy percent (70%) of patients with LT have no thyroid tissue in its normal location[5,6] . The LT cases may present with onset of slowly progressing dysphagia and symptoms of oropharyngeal obstruction before or during puberty. This occurs as a response to the increased demand for thyroid hormone in these hypermetabolic states. Similar response is also encountered during other metabolic stress conditions like pregnancy, infections, trauma, menopause, etc.[7]

Unless emergency surgery is indicated, suppressive therapy with exogenous thyroid hormone should be tried first in order to decrease the

size of the gland. This was the case in our patient and elective surgery following the suppression therapy was planned.

Additionally, levothyroxine therapy should be initiated after surgical excision as the lingual thyroid is the only functioning thyroid tissue found in 70% of these patients[5,6].

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Case Report

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Lobes of Wrisberg –A Case Report with Clinical Correlations

Sajan Skaria*

Abstract

Background: Knowledge of anatomical variations is required for the proper diagnostic and surgical purposes. Variations in the number of lobes, fissures and pattern of division of lobes are common in lungs. In some cases fissures may be incomplete or absent. This article is a case report of unusual lobe in the right lung. The accessory lobe was named as Wrisberg's lobe, who describes the lobe firstly. Stoloff in 1929 published a report of 5 cases. The shadow found in chest X – rays in early ages raises the question of extra lobe. Although the azygos lobe is a rare anomaly its radiological appearance has been well defined. Presence of extra lobe of lung would not be always detectable in radiological appearance. An azygos lobe may be confused with a pathological air space such as a bulla or abscess [1,2]. In addition, the abnormally located azygos vein may be mistaken for a pulmonary nodule, while a consolidated azygos lobe may be confused with a mass.

The detection of this anomaly and its interpretation of its anatomical features are interesting not only to anatomists but also helpful to pathologists and surgeons. The size and shape of the lobe varies considerably. This study aims to review some literatures about the accessory lobe and the clinical conditions which may cause.

Present variation was found in a routine dissection in the department of anatomy. The anomalous lung was removed and studied. The embryological and clinical aspect of the case was discussed.

Variations of lung anatomy are important for both the diagnosis and treatment of various diseases involving all the domains of medicine. The lobe, may however, be the seat of pathology localized in the lobe itself and subject to the same influences as other purely lobar conditions. The azygos fissure may be the site of pleurisy or exudates.

Key words: Azygos Lobe; Azygos Fissure; Right Lung.

Introduction

Anatomical variations of lungs including number, fissures, and lobes are important for clinicians. Hayashi et al. in 2001 concluded that the knowledge of the anatomy and normal variants of the major fissures is essential for recognizing their variable imaging appearances as well as related abnormalities. The right azygos lobe is a well recognized entity seen in about 0.4 percentages of chest roentgenograms and 1%of anatomical specimens. [2]. Azygos lobe is a result of unusual course of azygos vein. Hayashi et al stressed the knowledge of anatomy of lung along with variations is essential for recognizing various images of related abnormalities [3]. The existence of this unusual lobe was suspected early by some radiologists after noting unusual linear curved shadow in the upper right lung extending from the apex to the mediastinum not far from the level of second costal cartilage. In 1778 Wrisberg described the suspected linear shadow as an accessory lobe resulted in the unusual course of azygos vein and he called the accessory lobe as 'azygos lobe'. The azygos lobe itself is apportion of the upper lobe cut off by the persistence of the fetal position of the azygos vein, which in fetal life lies lateral to the spine. The vein therefore traverses the substance of the upper lobe, lying in an infolding of the parietal pleura. [3]

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Case Report

In routine dissection in the department of Anatomy for under graduate it was observed an accessory lobe in the upper part of mediastinal surface of right lung. The lobe was tongue shaped .The azygos vein was

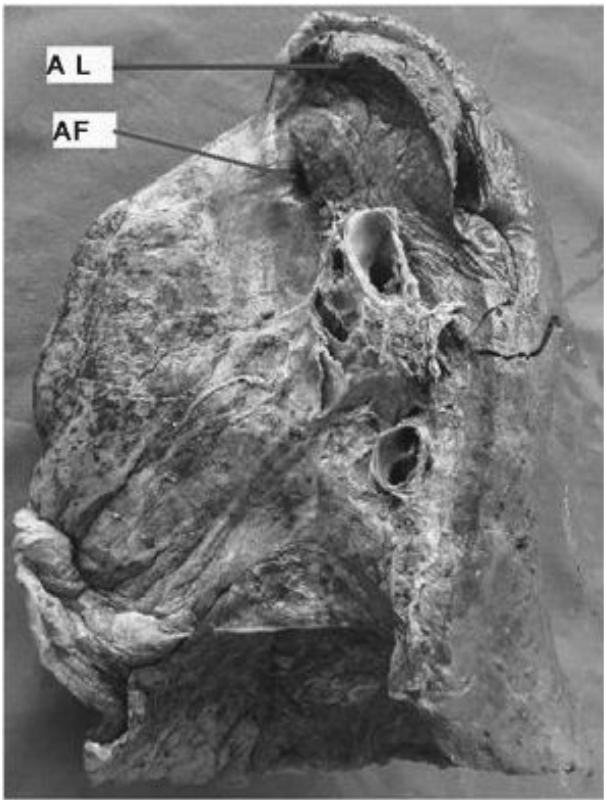

Fig. 1 Photograph showing mediastinal surface of right lung with azygos lobe.
AL-Azygos lobe, AF-azygos fissure

found to separate the extra lobe from the rest of the substance of lung. The fissure through which the azygos vein traverses is called as azygos fissure.

Discussion

Lungs are a pair of respiratory organs situated in the thoracic cavity. Each lung is conical in shape and has an apex, base, sharp anterior border, rounded posterior border and two surfaces namely-sternocostal and mediastinal. Each lung is divided into lobes by oblique and horizontal fissures. On right lung there are three such lobes and on left lung two. Numerous variations including number, fissures and lobes are already described.

Occasionally an extra fissure divides a lung or a fissure is absent. For example the left lung sometimes

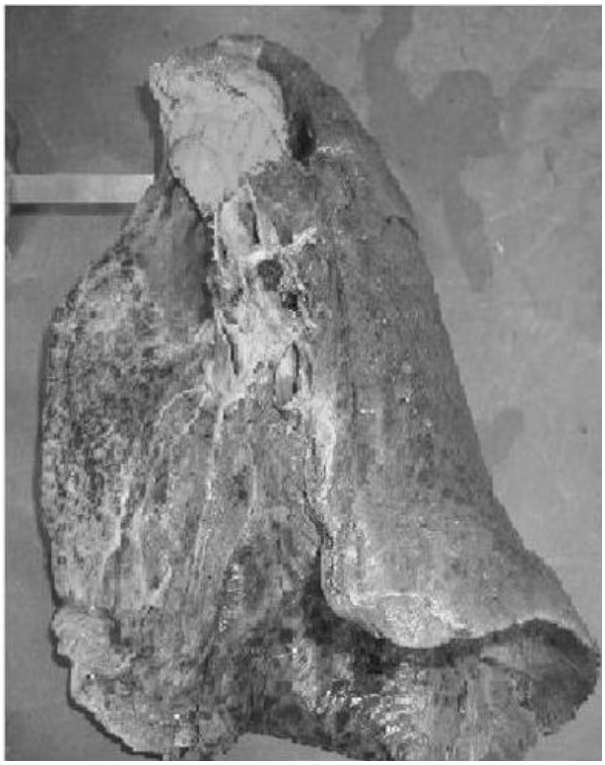

Fig. 2 Photograph showing azygos lobe. (Blue coclour)

has three lobes and a right only two .The most common accessory lobes is the azygos lobe which appears in the right lung in approximately 1 percent people. In these cases the azygos vein arches over the apex of the right lung, not over the right hilum, isolating the medial part of the apex as an azygos lobe [4].The accurate knowledge in the location of azygos lobe is essential for proper diagnostic and surgical procedures of the lung. It is also useful for the clinicians for accurate interpretation on different imaging techniques.

The present report describes the presence of an azygos lobe in the male cadaver. The anomaly was observed in routine dissection in the department of anatomy. In this case the mediastinal surface of the right lung presents a tongue shaped accessory lobe, which was separated from the rest of the lobe by azygos vein. The tongue shaped accessory lobe measures about 6 cm in lengths and 4.5 cm in width.

The anomaly is a result of unusual course of azygos vein. Normally the azygos vein proceeds up the posterior mediastinum on the anterior surfaces of vertebral bodies slightly to the right of the midline, passing over the intercostals arteries, with the thoracic aorta, and thoracic duct to the left. At the fourth or sometimes third, dorsal vertebra it bends forward and to the right bronchus and right pulmonary artery, and descends slightly to open into posterior surface of superior vena cava. Sometimes

the right posterior cardinal vein also invaginate the lungs with the azygos vein carrying pleural layers [5].Piersol in1864[6] remarked that the azygos major vein may be displaced outwards so that, instead of curving over the root of lung, it may make a deep fissure in the upper part of the lung, making off an extra lobe.

In contrast to other accessory lobes, the azygos lobe does not correspond to a distinct anatomical bronchopulmonary segment (1,7). It forms during embryogenesis when the precursor of the azygos vein fails to migrate to its medial position in the mediastinum, where it normally arches over the origin of the right upper lobe bronchus (7,4,1)

There are many theories put forward to explain the occurrence of azygos lobe. Cleland in 1870 suggested that it was due to the development during fetal life of adhesion between the lung and the chest wall, thus preventing the vena azygos from following its normal course. [8]

But this view was questioned. The more widely accepted theory is that of Stibbe (1919) who believed that the immediate cause is an alteration in the relationship of developing lung to the developing azygos vein [8]

Suess suggested the hereditary basis of azygos lobe. Underwood and Tattersall made a special attempt to determine the role of heredity in the etiology of azygos lobe. They found the anomaly among two of four sibs in one family and in one of the three sibs in second family. But their data do not give information regarding the exact mode of inheritance.

The presence of azygos lobe may make it difficult or even impossible to use video-assisted thoracic sympathectomy if the surgeon is unprepared to deal with this anatomical anomaly [9].Even though this anomaly is of no clinical significance, the knowledge about this helps them from confusions with other more serious conditions. Previous knowledge of the presence of azygos lobes is useful so that the surgeons are not taken by surprise during operation.

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[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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