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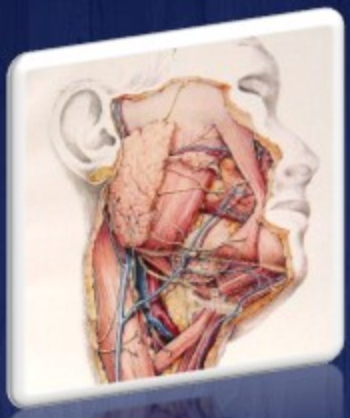
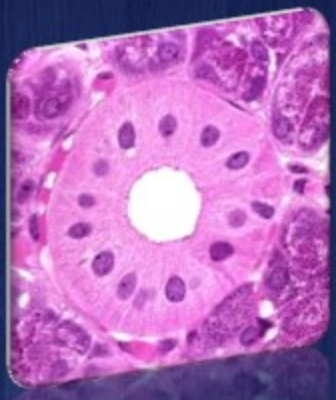
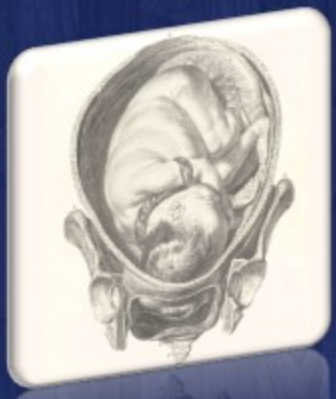


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- The word *Figure* should be spelled out in the text except when in parenthesis: *example* – Figure 1 **or** (Figs. 2-3).
- All anatomical terms should be in conformation with those specified in Terminologia Anatomica (1998) Stuttgart.
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- The manuscript should have a uniform style in a simple format. Complex formatting should be avoided.

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The main text of the manuscript should have the following subdivisions in sequence:

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    MATERIALS AND METHODS
    RESULTS
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Text Body
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    MATERIALS AND METHODS
    RESULTS
    DISCUSSION
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Illustrations
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Original Article

OPINION OF FIRST YEAR MEDICAL STUDENTS ABOUT THEIR MORNING LECTURE PATTERN

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ABSTRACT

Introduction: With the advent of the new curriculum of medical students (CBME), the role of teachers has now changed from being mere teachers to being considered as facilitators. Teachers are thus required to assist the students in their study. Hence, the student's point of view of their education pattern has become all the more important. This study was conducted to know the thoughts of first-year medical students about their morning lectures of different subjects.

Materials and methods: Fifteen questions pertaining to morning teaching pattern of 1st year MBBS students were formed via Google Sheets. A response link was created and sent to medical students of three batches (1st, 2nd, and 3rd year), when the first year students had completed three months of their course.

Results: Approximately half of the students (51.5) favored morning lectures (8am-9am) and majority (76.8%) wanted the first lecture to be Anatomy. Half (50.7%) preferred PPT method while around 40% wanted it to be in chalk and board fashion. Most of the students (90%) wanted a mixed language pattern. More than half (56.6%) agreed for 45 minutes of each lecture duration. Most of the students (86.9%) wanted some gap between two consecutive lectures. Majority of the students (81.6%) did not think the backbenchers to be mischievous and 70% did not advocate for separate rows for girls and boys.

Conclusions: Students had a view that Anatomy should be taught as first lecture in the morning and pattern should be mixed with modern audio-visual technologies.

Keywords: Opinion, Medical students, Morning teaching, Lectures

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INTRODUCTION

As we know that a typical day of first year medical students (MBBS) starts with lectures. This may be one of the three subjects, viz. Anatomy, Physiology, Biochemistry, which are taught during the 1st year of the course. These lectures are usually followed by one of the laboratory schedules or another lecture in queue. Lunch break of one hour duration is usually scheduled after 4-5 hours of academic activities. Post lunch session comprises of dissection +/- demonstration classes. This routine of teaching has been followed by most of the medical institutes in our country since long.

Learning is a process with a developmental skill where we gain knowledge through studying theory or practical experience. This could be either self-driven or can be taught by someone else. Teaching and learning may not always work hand in hand. Learning can be acquired without teaching, while teaching may not necessary be a prerequisite for learning. This means that learners may not require teachers, but teachers need learners to justify their efforts [1].

Fundamental reforms in undergraduate medical education have been advocated for over a century. Undergraduate medical education needs improvements to keep up with the ongoing changes occurring in medical practice. The complexities of medical care have greatly changed over the last century. But the methods of teaching medicine have changed only a little [2].

It has been felt that medical educationists currently encounter a great challenge in making students satisfied with regards to their curriculum and learning. Presently, there is a massive trend to reform medical curriculum from a teacher-centered learning to a student-centered learning [3]. A competency-based, dynamic, and learner-centric undergraduate curriculum has been introduced to train medical students in our country to create an Indian medical graduate [4].

First-year medical students have multiple options, so they prefer multiple learning styles [5,6]. Too much teaching, not enough learning: what is the solution? To achieve effective learning, it has been suggested that students must read, write and discuss about their problems. They should relate them to their experience and knowledge. They should apply the knowledge gained [6].

The final thought of present-day medical students at the end of the first year, i.e., their thoughts, judgments, stories, decisions, and ideals of medical education and practice, are strongly based on what they experience in the medical school and the learning environment they pass through. Knowing more about these may increase our understanding of the

mechanisms and formative power of the hidden curriculum. It may possibly help prevent depression and burnout in medical students. It may also contribute to the design of curricular and teaching improvements [7].

Wynter et al. explored the resources which were used by Australian medical students. In their sample they found that the majority of the students learnt a topic with textbooks and written notes along with the use of varieties of e-learning tools [8]. The primary aim of a classroom assessment is to observe and improve learning among students, rather than observe and improve teaching. This is true for both learners and teachers [9].

With a vast choice of teaching methodology present, it would definitely vary, not just with individual subjects, but within schools and individual teachers as well. In a medical school, the students have to understand the various subjects with a fast pace, and in a high stress environment. With this aim, the teachers are required to deliver substantial amount of knowledge in a comparatively limited period of time. This knowledge is a requirement for every student to memorize, and after analyzing, retain it; and apply in future when needed.

Keeping this aim in mind, every medical school undergoes a continuous upgradation through examination committees and curriculum committees working effectively. All this has improved and evolved from a teacher-centered learning and subject-based teaching to an interactive, problem-based, student-centered learning [10]. This makes teaching and learning a continuously evolving process keeping pace with modern education tools [11].

It has been postulated that if teachers can understand the learning habits of their students and adapt accordingly, this will have a definite benefit for both. While students on the other hand, would identify their own individual style of learning and incorporate them, ensuring tremendous satisfaction and improvement [12,13].

Furthermore, for any school to deliver an improved quality of education, a lot more dedication is required by integrating the modern learning style in teaching and technology. The modern teaching tools should incorporate and follow technological advancements to achieve such high quality [14].

Kharb et al., 2013 concluded that a learning style refers to an individuals' preferential method of collecting, processing, interpreting, analyzing, and organizing the information [15]. To study students' learning behavior and the impact on the quality of learning, methodologies were tested since the

1960s. Initially, a qualitative interview-based study was conducted. This study reported that differences exist in ways that students acquire and conceptualize the gathered knowledge [16,17].

In order for a student to qualify for medical education, prerequisites are maintained in each country. This requires students to complete their higher education with a science background. This means medical students are adults and hence have already established their own learning habits. Therefore, it becomes essential for medical education facilitators to customize instructions in such a way that medical students pursue, appreciate and understand them [18,19].

To bring objectivity, educational scholars have developed a model termed VARK (V-visual, A-auditory, R-read/write and K-kinaesthetic) that compiles information based on sensory modalities used by learners for their best outcome. This model determines the modalities by which learners prefer to process information. Visual learners process information best if they can see it, auditory learners prefer to hear information, read-write learners prefer to see written words and kinaesthetic learners like to acquire information through experience and practice [20].

The objective of this study was to assess the medical students' thoughts about the morning teaching pattern, when they come fresh to college in the morning. Their opinion matters when they know the contents of subjects and what they are required to know about the subject.

MATERIALS AND METHODS

Fifteen questions pertaining to morning teaching pattern were framed via Google Sheets. The questions were framed according to what we, as teachers, usually follow, considering it would benefit students. A response link was created and sent to 450 (150 each from 1st, 2ndand3rd year) medical students. The first-year students had completed at least 3 months of classroom teaching.

The study was conducted as a cross sectional study, which was of a close ended multiple choice questionnaire type online survey in Department of Anatomy, Varun Arjun Medical College, Shahjahanpur, India. The participating students were given 15 days time to record their responses online.

450 (150 each from 1st, 2nd and 3rd year) MBBS students were provided the link to the questionnaire in a common WhatsApp group. A total of 360 students responded. Data obtained were collected and analyzed statistically using Statistical Package for the Social Sciences software and Microsoft Excel 2007.

RESULTS

Most (83.1%) students preferred to start their anatomy day with lectures followed by dissection and then osteology class. Only half (50.7%) preferred PPT method. For the question about timings and subject to start the lecture in morning, only 51.5% agreed it to be before 9am (between 8-9am). Some (12.1%) opted for later than 9am. Majority (76.8%) wanted the first lecture to be Anatomy followed by 14% who preferred Physiology while around 40% wanted it to be in chalk and board fashion. It is interesting that 7.5% wanted notes dictation.

It was interesting to note that 90% students wanted a mixed language pattern followed equally by either English or Hindi. Because the students belonged to Hindi speaking area, so Hindi was kept an option. Just more than half (54.4%) wanted the teacher to follow multiple books. Otherwise, 45.6% wanted to be single book to be the source of teaching.

There was no clear consensus about following of lectures. A total of 39.1% students wanted to take notes on notebook during lectures, while 24.1% preferred to make their own notes later on. It was interesting to see that 21.6% wanted to use Notepads or Tablets for taking notes and about 1/7th (13.2%) wanted to directly mark their books.

About 3/4th students (74.7%) agreed to have pre and post lecture assessment. However, 1/5th (25.3%) disagreed with the idea. Regarding duration of each lecture 56.6% agreed for 45 minutes while only 36.6% wanted it to be of 1 hour duration.

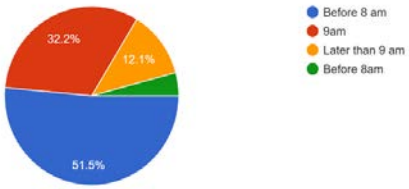
A total of (86.9%) wanted some gap between two consecutive lectures. Only 13.1% had no problem in two consecutive lectures. The interesting part was that almost half (51.6%) wanted attendance to be made compulsory and rest half (48.4%) did not want it. More than 2/3rd students (62.8%) had a view that it was beneficial to sit in the front row while 37.2% disagreed with the view. The most astonishing point of the survey was that almost 4/5th of students (81.6%) did not think the backbenchers to be mischievous.

In response the sitting arrangement questions almost 70% did not advocate for separate rows for girls and boys. They found it comfortable to sit together. About 54.4% opined that more than one teacher of different medical subjects but related topics should be present, to help them better understanding of that topic. Still 45.6% wanted only one teacher to be present.

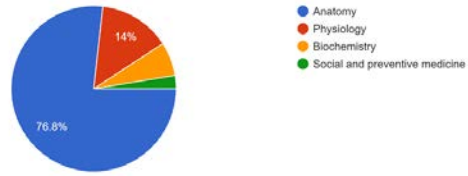
DISCUSSION

Our medical students are already tech-savvy when they enter the college. They use these devices mostly at night. A result of this is late

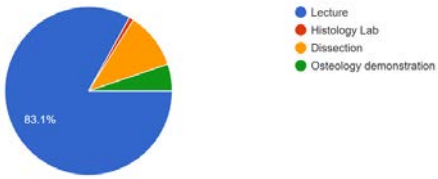
1- When should lecture start in the morning?
239 responses



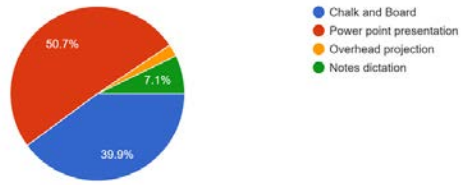
2- Which subject should have first lecture in morning?
349 responses



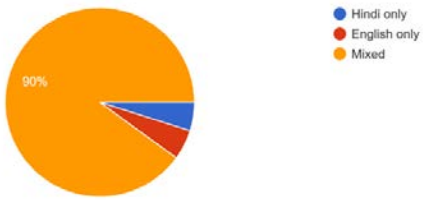
3- What should be the mode of anatomy teaching at the start of day?
350 responses



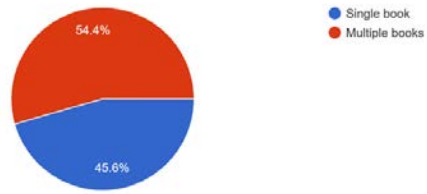
4- What should be the mode of lectures?
351 responses



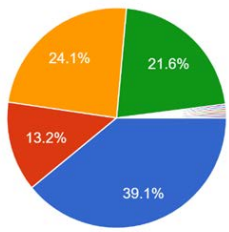
5- In which language anatomy lecture should be taught?
350 responses

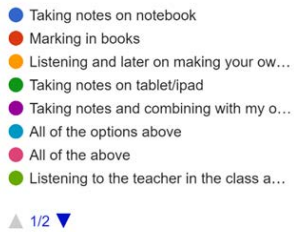


6- Teacher should follow which books pattern?
351 responses



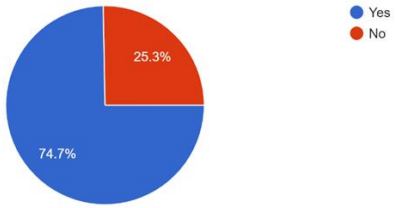
7- How do you like to follow lectures?
348 responses





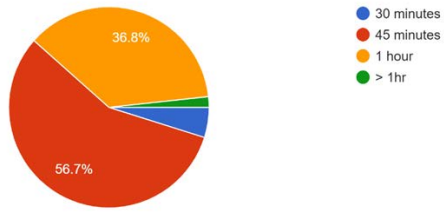
8- Should there be short Pre-- and Post-- lecture assessment?

340 responses



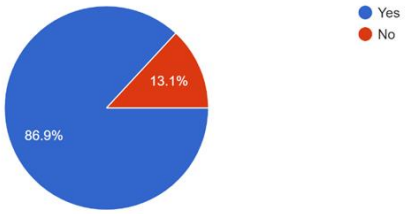
9- What should be the duration of lecture?

351 responses



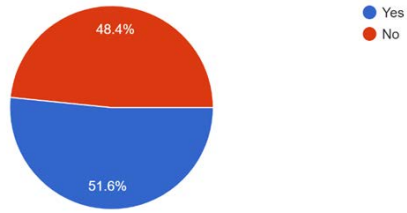
10- Should there be gap between two consecutive lectures?

351 responses



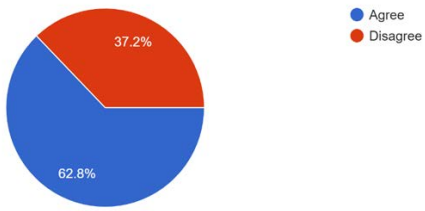
11- Should attendance be made mandatory for lectures?

345 responses



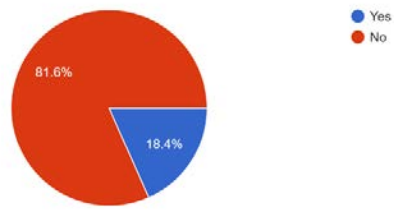
12- Do you agree that sitting in front row is beneficial?

347 responses



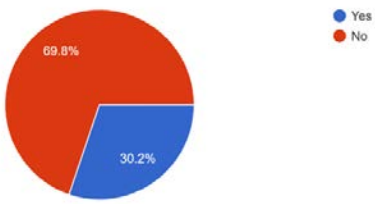
13- Do you think backbenchers are mischievious?

343 responses



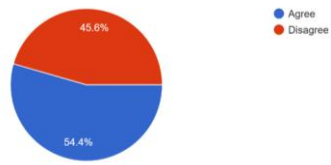
14- Do you think boys and girls should sit in separate rows?

344 responses



15- Should different teachers be present for a single lecture to cover different headings(Clinical and non clinical)?

349 responses



morning risers becoming a trend. They often fail to attend morning theory classes, and many of them who attend classes do not pay sufficient attention. That is the probable reason of only 51% agreeing for the lecture between 8-9 am. They wanted to study Anatomy with a fresh mind in the morning and that too in the form of lecture. As they are fond of technology, thus half of them preferred power point presentation mode.

However, still 40% found it difficult to understand and opted for older method of teaching in the form of chalk and board. All of the students knew English and Hindi, but fluency in Hindi was the basis for their preference as mixed language of teaching mode. To gain more knowledge, multiple book consultation was the preference of the students. The traditional pattern of taking notes in lectures is vanishing and is being replaced by modern technology like tablets.

Duration of lectures should be reduced to 45 minutes and sometime must be given for pre-read, post-read sessions. This supports the study of Luzan et al [6], who advocated reading, writing and discussion for effective learning. To refresh the mind, there should be some gap between two consecutive lectures which was agreed to by almost 90% of the students. Contrary to old education system beliefs, only half of the students agreed to make attendance mandatory.

Although 2/3rd wanted to sit in front rows, still 4/5th do not consider backbenchers to be mischievous. This is against the common belief of teachers, who usually think that students sitting at back do not study. Because they are students of modern era, so they do not support the idea that girls should sit in separate rows. They strongly support the idea of CBME that multiple teachers should be present to teach a single topic.

The competency-based medical education (CBME) curriculum has been designed to identify the desired outcomes; define the level of performance for each competency; and develop a framework for teaching and assessing competencies. CBME (Competency Based Medical Education) is student-centric and focuses on competencies as endpoints. The internal assessment (IA) is continuous evaluation of student's performance and is given greater emphasis.

CONCLUSION

The new curriculum of medical students (CBME) has changed the role of teachers. They are now considered as facilitators. They are required to assist the students in their study. So now onwards, student's point of view of their education pattern will bear a lot of importance. Keeping that in view, we conducted the present study, and came to conclusion that students want to use new technology for their study.

They want their study to be properly assessed

but are confused about following the lectures. This could be due to different study habits they have formed in their school days. The students are aware about the type and content of their lectures. Those who want to study, will do so, wherever they sit in class. Pattern of Pre-read and Post-read is beneficial to all.

Our study showed that students favored mixed pattern in three major domains; in teaching methods, i.e. both power point presentations and chalk & board, being taught in a mixed English and Hindi language and for boys and girls sitting together. Students prefer not only short duration of the classes but also prefer a gap between two consecutive lectures.

This study gave us an idea about students' perspective of morning teaching pattern which is being followed at our institute. Now this will certainly help teachers in preparing their strategy to help students. This will certainly result in more interest in studies from the students and a better understanding of their lectures. Better understanding will result in better doctors and human beings, which is the goal of our new CBME pattern.

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Original Article

ANATOMICAL VARIATIONS IN THE ORIGIN OF GONADAL ARTERY-A COMPUTED TOMOGRAPHY ANGIOGRAPHIC STUDY

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ABSTRACT

Introduction: A sound knowledge of variations of gonadal artery is required during operative, diagnostic and endovascular procedures in the abdomen and pelvis especially with the advancement of newer intra-abdominal operative and laparoscopic techniques. The aim of this study was to analyze the normal anatomy of gonadal arteries and their variations by MDCT in the north Indian population.

Materials and methods: 500 patients (aged 18 to 70) referred to the department of Radio diagnosis at Subharti Medical College & Hospital, Meerut, and neighboring imaging centres in the NCR underwent the cross-sectional study (MDCT). From August 2019 to July 2022, MDCT scan images of the abdomen region were examined for the normal anatomy of the gonadal arteries.

Results: Variation were found in both sides gonadal arteries in males and females. The frequency of variations of gonadal arteries in terms of their origin was more commonly found in males.

Conclusions: Various morphological anomalies of gonadal arteries are reported. The possible embryological basis for this variation as well as its clinical significance, are discussed. The knowledge of this variation will help the radiologists and surgeons in avoiding clinical complications during uro-radiologic interventions and surgical procedures such as renal and gonadal surgeries.

Keywords: Gonadal artery, Testicular artery (TA), Ovarian artery (OA), Renal artery (RA).

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INTRODUCTION

The gonadal arteries are two long slender vessels that usually arise from the anterolateral aspect of the abdominal aorta a little inferior to the renal arteries. The vertebral level of their origin varies from the level of first to third lumbar vertebrae [1]. Each artery passes inferolaterally under the parietal peritoneum on psoas major [2]. In addition to the normal pattern, several other sites of origin of the gonadal arteries have been described; among them the renal, accessory renal and suprarenal arteries are most commonly mentioned and more rarely the lumbar, common or internal iliac and superior epigastric arteries [3,4,5,6,7].

Anatomy of testicular artery has been well studied because of its importance in testicular physiology, and testicular and renal surgeries. Each testicular artery passes obliquely downwards and posterior to the peritoneum on the psoas major muscle and enters the inguinal canal through the deep inguinal ring. Along their course, the testicular arteries are accompanied by the testicular veins.

They pass through the deep inguinal ring of the corresponding side and then become constituents of the spermatic cord. Each ovarian artery descends behind the peritoneum and crosses the external iliac artery and vein to enter the true pelvic cavity. It enters in the suspensory ligament of ovary and splits into a branch that supplies ovary and another branch supplies uterine tube. On each side, a branch passes lateral to the uterus to unite with the uterine artery, other branches accompany the round ligaments through the inguinal canal and supply the skin of the labium majus and inguinal region and terminate in the gonads, to which they supply [2].

Variations of gonadal arteries had been related to the embryological development from the lateral mesonephric branches of the dorsal aorta [8]. Such variations of the gonadal arteries have clinical and surgical significance with respect to their potential influence on the blood flow to the gonads and to the hemorrhagic complications following retroperitoneal operations. Awareness of the possible variations of gonadal arteries is necessary for adequate surgical management. [5, 6]. The goal of the present study is to analyze the variation in terms of their origin of testicular and ovarian arteries on either side by Multi detector Computerised Tomographic Angiography in the north Indian population.

MATERIALS AND METHODS

The present cross- sectional study was performed on the 500 patients (including both side males & females between 18-70 years of age) referred to the Department of Radio diagnosis, Subharti Medical College &

Hospital, Meerut and nearby Imaging Centres in the NCR for Multi detector Computerised Tomographic Angiography (MDCTA) for evaluation of various suspected abdominal pathologies. CTA scan images were reviewed for normal anatomy of gonadal arteries from August 2019 to October 2022.

A randomized sampling technique was used in the study. A proper ethical clearance was obtained from Ethical committee of the Subharti Medical College and Hospital Meerut.

Inclusion criteria :

- Good quality of reformatted contrast-enhanced MDCTA images of the gonadal arteries.
- Absence of morphological features of the gonadal arteries.

Exclusion criteria :

- Allergy to contrast
- Contraindication to radiation exposure (ex: pregnancy)
- MDCT images with artefacts, suboptimal post contrast arterial opacification.
- MDCT images of patients with abnormalities that could interfere with optimum evaluation of the gonadal arteries.

RESULTS

Present study was done on the 500 patients including 272 male and 228 female patients.

Out of 270 male patients, in 260 cases normal origin of right testicular arteries was found in present study while right testicular artery arising from right renal artery in 9 cases, 2 cases showed right testicular artery arising from right common iliac artery and in 1 case double right testicular artery was found(one arising from right renal artery and one arising from aorta). Similarly in left side testicular artery, in 262 cases normal origin of left testicular artery was found while in 9 cases left testicular artery arising from left renal artery and in 1 case it is arising from left common iliac artery tabulated in table1 & 2.

Out of 228 cases of females, normal origin of right ovarian artery was found in 225 cases present study. In 2 cases right ovarian artery arising from right renal artery and in 1 case it is arising from right internal iliac artery. Similarly, on the left side, normal origin of left ovarian artery was found in 226 cases. In one case left ovarian artery arising from left renal artery and in one another case it is arising from left internal iliac artery tabulated in table 3 & 4.

In the present study the frequency of variations of gonadal arteries is more in males as compared to females on either side.

DISCUSSION

The variations of Gonadal arteries showed deviations in their origin, course and number

Variations of RT testicular artery	Number of patient (n-272)	% of variations
Normal	260	95.6%
Arising from Rt renal artery	9	3.3%
Arising from common iliac artery	2	0.7%
Double testicular artery one arising Rt renal artery and one from aorta	1	0.4%

Table 1. Frequency of RT testicular arteries in the present study.

Variations of Lt testicular artery	Number of patient(n-272)	% of variations
Normal	262	96.2%
Arising from common iliac artery	1	0.4%
Arising from Lt renal artery	9	3.4%

Table 2. Frequency of LT testicular arteries in the present study.

Variations of RT ovarian artery	Number of patient(n-228)	% of variations
Normal	225	98.7%
Arising from RT renal artery	2	0.9 %
Arising from RT internal iliac artery	1	0.4 %

Table 3. Frequency of RT ovarian arteries in the present study.

Variations of Lt ovarian artery	Number of patient(n-228)	% of variations
Normal	226	99.2%
Arising from Lt internal iliac artery	1	0.4%
Arising from Lt renal artery	1	0.4 %

Table 3. Frequency of LT ovarian arteries in the present study.

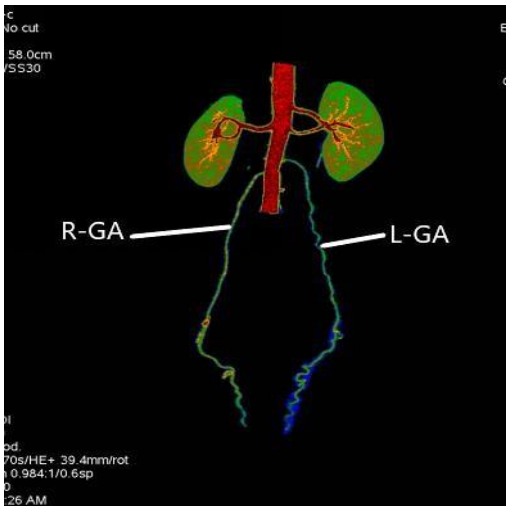

Fig. 1. Normal origin of right and left gonadal (testicular) artery and LT accessory renal artery.

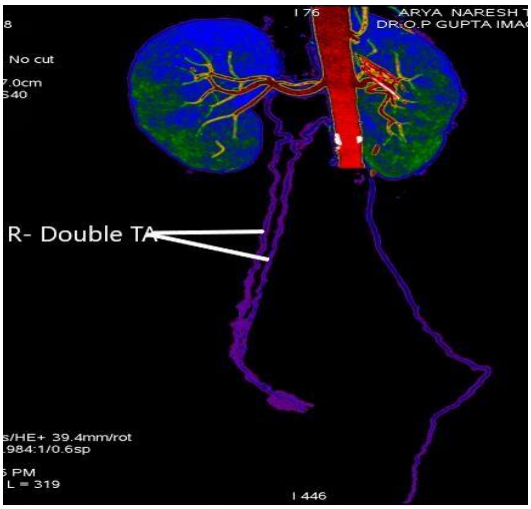

Fig. 2. Right double testicular artery (one arising from RT renal artery and one arising directly from aorta).

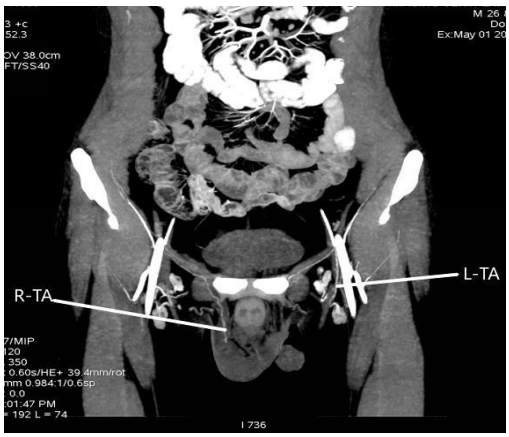

Fig. 3. Right and left testicular arteries arising from common iliac arteries.

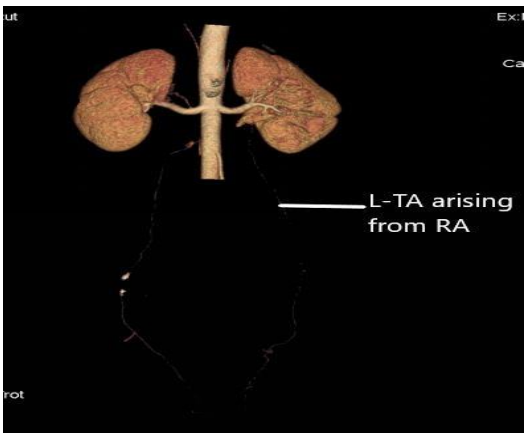

Fig. 4. Left testicular artery arising from left renal artery.

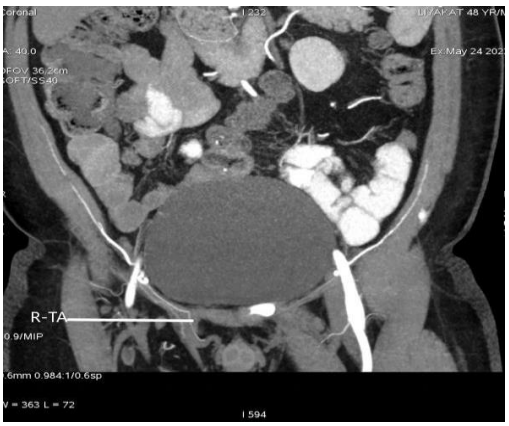

Fig. 5. Right testicular artery arising from right common iliac artery.

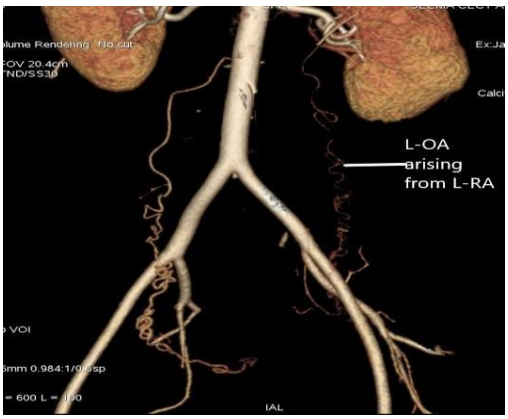

Fig. 6. Left ovarian artery arising from left renal artery.

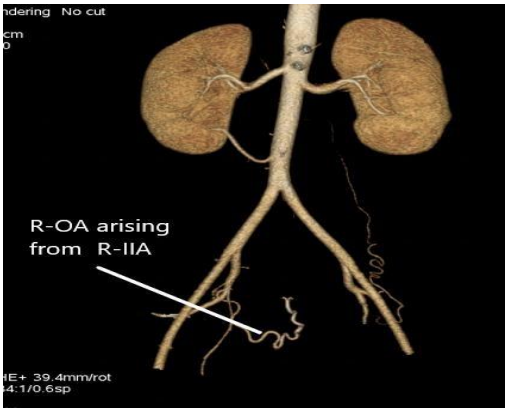

Fig. 7. Right ovarian artery arising from right internal iliac artery.

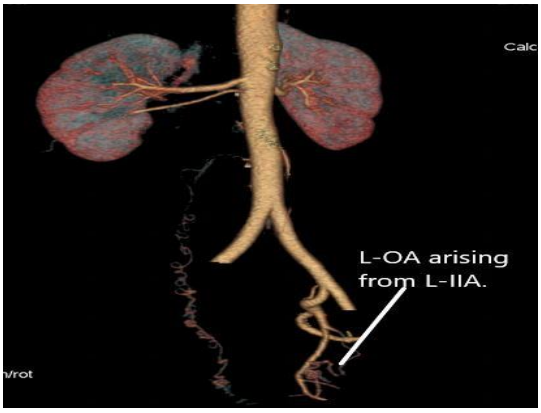

Fig. 8. Left ovarian artery arising from left internal iliac artery.

unilaterally or bilaterally. They may be doubled, tripled, or even quadrupled and may arise from a common stem with the suprarenal arteries [1,6]. The normal pattern according to classical anatomical textbook is followed in the 83% of the cases [3], while several studies report anomalies in their origin with an incidence, which ranges from 4.7% to 75% [4,9]. More specifically, the gonadal arteries are reported to arise from the main renal arteries with a frequency, which varies from 1.47% to 17% [3,9], while their origin from an accessory renal artery ranges from 5.5% to 31.25% [5,9].

The latter is recorded to occur bilaterally only in 1.1% of the total cases [5]. The origin of gonadal artery from accessory renal artery was present in 6.67% cases. The testicular arteries tend to present anomalous origin more often (15.5%), than the ovarian arteries (2.2%) [5]. In respect to above mentioned studies the present study also showed a similar finding (anomalous origin of testicular artery was found in 4.4% on right side and 3.8% on left side while anomalous origin of ovarian artery was found in 1.3% on the right side and 0.8% on the left side).

An accessory left testicular artery from the descending aorta has been reported by Loukas and Stewart [10]. Left testicular artery originating behind the left renal vein at the level of the left renal artery from the abdominal aorta, and getting entrapped between the two divisions of the left renal vein, has been reported by Satheesha [11].

The persistence of cranial lateral mesonephric artery results in a high origin of the gonadal artery, probably from suprarenal or from a more superior aortic level studied by Salve et al. [12]. Variations of gonadal vessels have an embryological basis. The developing mesonephros, metanephros, suprarenal glands and gonads are supplied by nine pairs of lateral mesonephric arteries arising from the dorsal aorta. These arteries are divided into three groups viz: the first and second arteries, the third to fifth and the sixth to ninth arteries constitute the cranial, middle and caudal group respectively.

The middle group gives rise to the renal arteries. Persistence of more than one artery of the middle group results in multiple renal arteries [13,14]. The accessory renal artery could therefore be a result of a persistent lateral mesonephric artery from the middle group. Gonadal arteries can arise from any of these nine mesonephric arteries though they usually arise from the caudal group [14]. In the present study, the origin of the left testicular artery from the lower polar accessory renal artery suggests the embryologic origin of this vessel from the middle group.

The anatomy of gonadal arteries has assumed importance because of development of new operative techniques within abdominal cavity for operations like varicocele and undescended testis. During laparoscopic surgery of abdomen and pelvis many complications occur due to unfamiliar anatomy in operative field. Thus, it becomes imperative to carefully preserve the gonadal artery to prevent any vascular insults to gonad, as the gonadal artery is its unique source of blood supply.

DISCUSSION

Knowledge of variations of gonadal arteries is important during operative, diagnostic and endovascular procedures in the abdomen. Variations of the renal and testicular artery should be considered due to the increased demand for living donor graft in renal transplants, the knowledge of such variant anatomy of the renal and gonadal arteries is an important prerequisite to successful renal transplantation and comprehensive arteriography of these vessels before surgery is recommended. The origin of the testicular artery from the renal artery should be noted as injury to this vessel may result in testicular infarction [15,16].

The knowledge of variations is of utmost importance to the urologist, surgeons dealing with kidney retrieval and transplantation,

radiologists, persons performing endourologic procedures and various interventional techniques. Anatomical knowledge of testicular artery is essential for performing operative techniques to treat varicocele and undescended testes within the abdominal cavity.

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Original Article

TO ESTIMATE AGE AND GENDER RELATED MORPHOMETRIC CHANGES IN LATERAL VENTRICLE OF BRAIN BY EVANS INDEX IN NORTH INDIAN POPULATION

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ABSTRACT

Introduction: Several histopathological and gross changes are seen in human brain as age increases, causing enlargement of the lateral ventricles. Morphometric measurement and ventricular size of lateral ventricle is of trivial importance to identify certain changes and correlate it with clinical significance. This study is designed to provide a normal data of Evans Index of lateral ventricle of brain and its association between both the genders and its correlation with different age group of North Indian Population.

Materials and methods: This study was carried out in the Department of Anatomy & Department of Radiodiagnosis, S.N Medical College, Agra, U.P. In this prospective study, Computed Tomography Scans of 200 patients between the age 18 – 75 years (120 Males and 80 Females) were done and measurements of lateral ventricle of Brain and were analyzed statistically.

Results: The overall mean value of Evans Index is 0.23 ± 0.02. Evans Index in males is 0.23 ± 0.02 and mean Evans Index in females is 0.22 ± 0.01, the difference being statistically significant between both the genders as $p = 0.0001^*$ ($p \leq 0.05$).

Conclusions: Evans Index is a widely and most commonly used linear measurement for the determination of ventricular dilation which is helpful in diagnosis of neurological conditions (e.g. schizophrenia, bipolar disorder and Non Pressure Hydrocephalus). If the Evans Index ranges from 0.25 to 0.30 represented early ventricular enlargement and if the Evans Index value is more than 0.30, it suggests Hydrocephalus.

Keywords: Lateral Ventricle, Brain, Morphometry, Ventricular system, CT, Evans Index

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INTRODUCTION

Anatomists and Researchers have always been enthralled to study human brain. Human brain structure is complex, and no one is completely aware of its function. Structural changes occur which are normal and expected as age increases. Before any aberrant findings are interpreted, comprehensive knowledge of normal changes occurring in the brain with increase in age is necessary to be understood [1]. In the 4th century B.C. scholars and physicians started learning about cerebral ventricles [2]. Initially it was believed that lateral ventricle harbored the soul and vital spirits. Anatomists like Constanzo Varolio and Andreas Vesalius in 16th century discovered ventricles are filled with CSF [3].

Later it was discovered that, Human Brain has two lateral ventricles, forming a 'C' shaped cavity in the cerebral hemisphere containing 3 horns divided into anterior horn, posterior horn and inferior horns and body occupying the parietal lobe (Fig. 1). The "body" and "atrium" are situated between the anterior and posterior horns and the atrium continues as posterior horn in the occipital lobe [4].

Both the ventricles communicate with the third ventricle through foramen of Monro [5]. The cavity within the brain ventricles is filled with Cerebrospinal Fluid (CSF). The lateral ventricles are the largest paired ventricles present within the cerebrum [6].

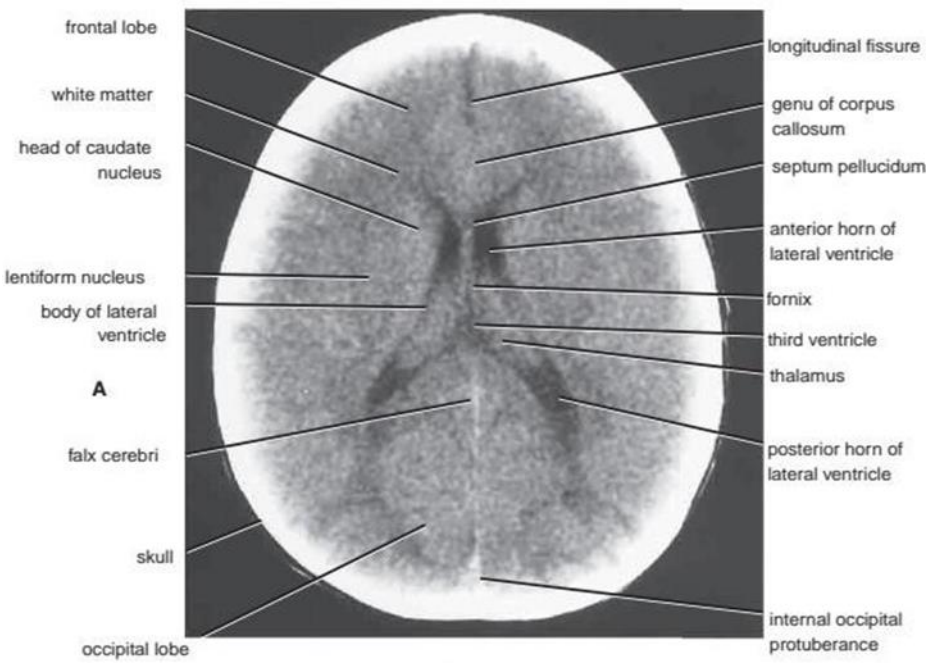

Fig. 1. Transverse section of Brain at Mid – Ventricular Level
Snell's Clinical Anatomy, 9th ED, 2012, Page No – 678

Cortical atrophy and enlargement of ventricles are major changes that may occur without neurologic deficits [7]. CT Scan is a non-invasive technique developed by Hounsfield GN, it provides transverse slices images of brain utilizing X-ray with or without the use of contrast media8.CT is preferred as its non-invasive and no artifacts are produced, with this technology measuring ventricles became effortless [9-11].

Pneumoencephalography and ventriculography are the older techniques of visualizing the ventricular system by injecting air through lumbar puncture under local anaesthesia [12]. In recent years, CT scan have replaced the older methods of studying ventricular system. Objective and morphometric studies of human brain ventricles is under limelight, recently due to it is relation with several pathological evidences such as schizophrenia, hydrocephalus, tumors, trauma and as well as gender and aging which could lead to dementia [13].

Studying normal and abnormal anatomy of ventricular system is helpful for clinicians, neurosurgeons, and radiologists in diagnosing such pathological diseases [14]. Knowing the normal measurements of the cerebral ventricles in the living human has great importance in the diagnosis and monitoring of several pathologies [15]. It should be noted that there is a continuous debate in the literature of neuroanatomy, psychiatry, neuroradiology and neurology over the best method of assessing the various parts of the cerebral ventricular system and the information known regarding the accurate measurements of the brain ventricles is very limited [16]. Since very little work has been done on measurement of cerebral ventricular system in India the present work is undertaken to study morphometric analysis of the lateral ventricle of the brain in normal Indian subjects using CT scan [17].

So, this study is to determine association of both the genders and correlation of age with increase or decrease in size of Lateral Ventricle of brain in adult human population of North India.

AXIAL VIEWS OF CT SCAN FOR DETERMINING EVANS INDEX:

The frontal horns of lateral ventricle are best seen in axial view at the level of head of caudate nucleus (Fig. 2).

MATERIALS AND METHODS

This cross - sectional prospective study composed of two hundred Brain Computerized Tomograms (CT) of North Indian Population aged between 18 to 75 years were obtained from a Government based diagnostic Radiology Centre, S.N Medical College, Agra, Uttar Pradesh, India. The brain CT scans were taken from patients

complaining of headaches, migraines or came due to road traffic accidents. But CT scan readings which were found to be normal by a qualified radiologist between 01 January 2021 to 30 June 2022 were only considered in this research.

DICOM Software was used to visualize normal brain CT scans and for recording of measurements of different parameters. All brain CT scans that met the inclusion criterion below, were only considered in this study. The research started, only after the clearance by the Ethic Committee of our college. The clearance was given on 7 December 2020.

INCLUSION CRITERIA: CT scans without any pathological findings reported normal by radiologist was only considered for this study. Both the genders was taken for this study. CT Scans of only North Indian individual was taken up for this study.

EXCLUSION CRITERIA: Any history of Cerebral Infarction, Local mass lesions in brain, Hydrocephalus, Trauma , Drug abuse , Alcoholism, Previous Intra cranial surgery or individuals below 18 years of age.

CT SCAN MACHINE: In this study, CT scanner utilized was 64 Slice GE OPTIMA 660 CT scan machine. Exposure factors for the CT scan were set at 140 kvp and 160 mAs, slice thickness set at 5 mm. With iterative reconstruction algorithm all CT Scans were carried out in axial mode.

CT Scan procedure was explained to the patient, consent was taken prior to CT scan . Patient was asked to remove any metallic items (e.g. earrings, hairpin, dentures etc)

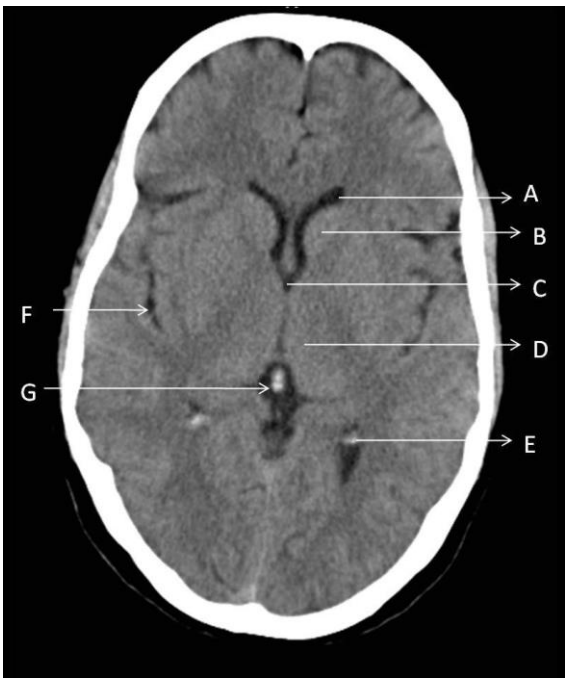

Table 3. Frequency of RT ovarian arteries in the present study.

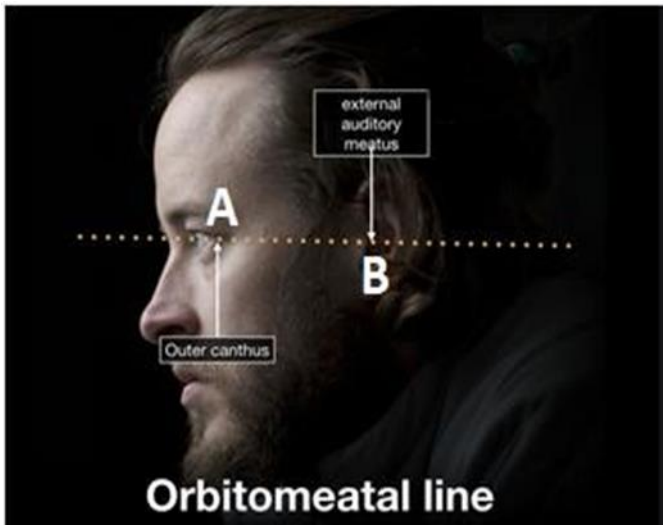

Fig. 3. Orbitomeatal line [18,19]
A – Outer Canthus of the eye, B – External Auditory Meatus

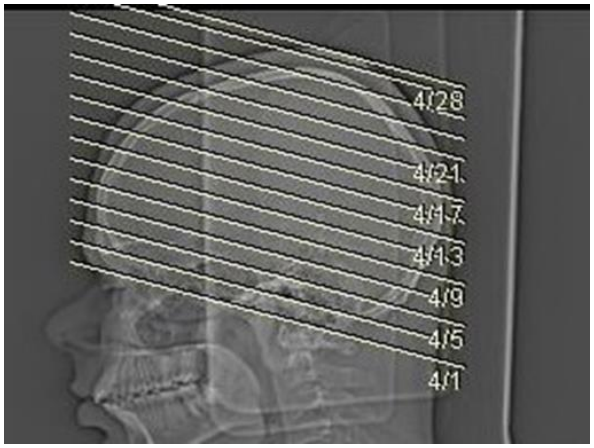

Fig. 4. CT images were obtained parallel to orbitomeatal line from foramen magnum to the vertex of the skull 20.

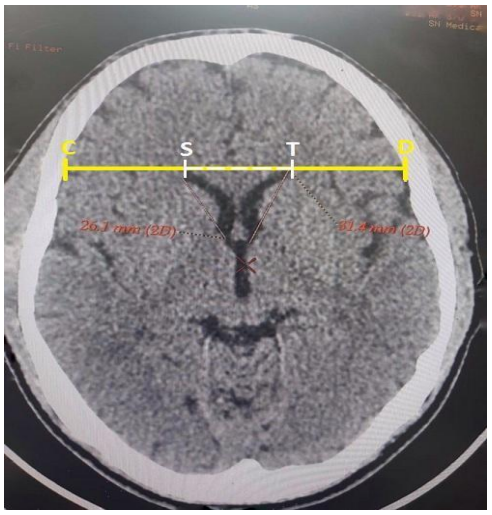

Fig. 5. Axial CT image of the brain at the level of Caudate nucleus when the ventricular system is maximum dilated. [21]

before entering CT scan room and to remain NPO for few hours before the examination, if contrast CT was required.

Patient was asked to lie down on the CT table in supine position, head was centralized and for its correct positioning, support was provided to the patient. To confirm correct positioning of patients, lateral scout image was captured to verify suitable exposure factors.

The scans was obtained parallel to the orbito-meatal line18 19, it is defined as the line drawn from the outer canthus of the eye to the centre of external auditory meatus (Fig. 3).

The scans were obtained from the base of the skull considering the lowest tomographic section to the vertex of the skull running parallel to the orbitomeatal line (Fig. 4), without coinciding, 10 to 12 axial images of brain were obtained. All other technical parameters of the scans were as per the established standards. (Ex. time in ms, potential in k v, current in mA) and slice thickness of 5 mm. CT scan total duration was 20 - 30 seconds.

Patients' CT scan was read by the radiologist and if found to have no pathological disease and if reported normal, such patients' reports were viewed in DICOM Image Software, and with the help of measurement tool installed in the DICOM software, measurement of lateral ventricle of brain was recorded in millimeter (mm).

MEASUREMENT TAKEN

EVAN'S INDEX 21: It is defined as the ratio of the distance between tip of bilateral frontal horns (S - T) and the distance between the maximum internal diameter of skull (C - D). Both the measurements are taken at the same level. Both the measurement is taken in a section, above the level of head of caudate nucleus where the ventricular system is most dilated. (Fig. 5)

Evan's Index Formula:[21]

$$S - T / C - D$$

Normal Range [21] = 0.20 – 0.25

RESULTS

This data analysis of 200 patients is performed using SSPS 16th version. The overall 200 data was distributed in 5 different age group. To compare the results between the 5 different age group, also mean and standard deviation was calculated for each parameter. ANOVA and t – test was used for calculating 'p' value .

DISCUSSION

Evans Index is widely and most commonly used linear measurements for the assessment of ventricle size and detect ventriculomegaly due to cerebral atrophy .

GENDER	EVANS INDEX MEAN ± SD	p-value
MALE	0.23 ± 0.02	0.0001*
FEMALE	0.22 ± 0.01	

Table 1. Evans Index according to gender

AGE GROUP (IN YRS)	EVANS INDEX MEAN ± SD	p-value
18 – 30	0.23± 0.01	0.00001*
31 – 40	0.23 ± 0.02	
41 – 50	0.22 ± 0.02	
51 – 60	0.22 ± 0.01	
61 – 75	0.22 ± 0.02	

Table 2. Evans Index according to different age group

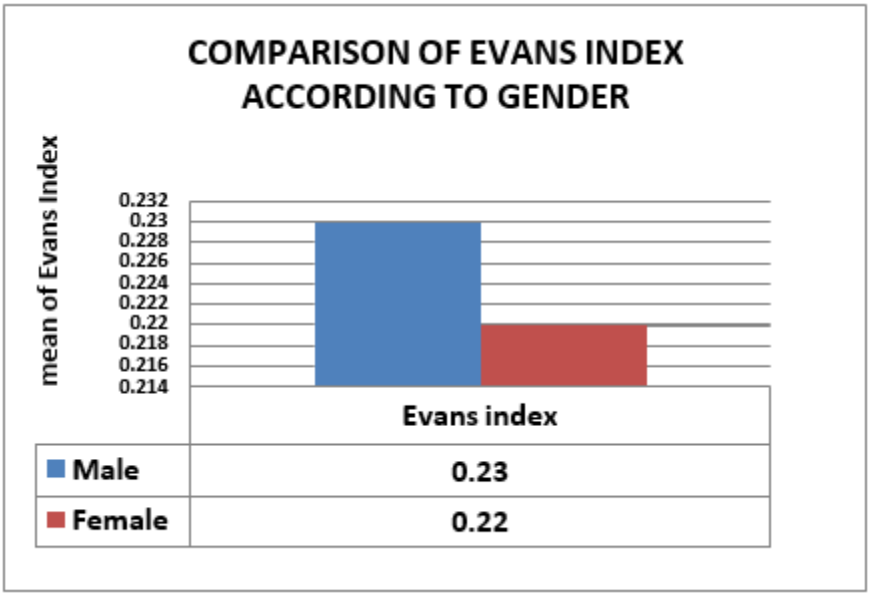

Fig. 6. Comparison of Evans Index according to gender

In our study, the mean value of Evans Index in males is 0.23 ± 0.02 and females is 0.22 ± 0.01 (Table 1). The overall mean value of Evans Index in comparison to 5 different age group is 0.23 ± 0.02 (Table 2). The normal Evans Index value is 0.20 – 0.25.

In relation to gender, the p value was found to be statistically significant, as p = 0.0001 (p<0.05*) signifying that there was statistical difference in the size of Evans Index in both the genders of North Indian Population (Table 1).

In relation to age, the p value was found to be statistically significant, as p = 0.00001 (p < 0.05*) signifying that there was statistical difference in the size of Evans Index in different age groups of North Indian Population (Table 2).

According to William [4], Evans was the first person who felt the need to define normal limits of the cerebral ventricles, and linear measurements were adopted in children. He found that the normal range of Evans index was 0.20 to 0.25. If the Evans Index ranges from 0.25 to 0.30 represented early ventricular enlargement and if the Evans Index value is more than 0.30, it suggest ventricular enlargement.

Evans Index increases with increase in age due to the fact that the brain shrinks with age while the ventricles dilates to compensate the loss, leading to increase in Evans Index [22]. Our findings are consistent and similar, with those given by Gawler [22] with the upper limit of Evans Index being 0.25. The international guidelines for diagnostic cutoff value for ventriculomegaly / hydrocephalus is ER>0.30 (Toma - AK) [23].

In the study by Vishram Singh [24], the normal mean value of Evans Index is 0.269 +/- 0.03, being higher in males than in females, however the difference being statistically non- significant (p>0.05). The range was also wider in males. It also showed statistical difference in different age group as p = 0.013 (p<0.05). Whereas in the study by Namrata Kolsur [25] mean value of Evans index was 0.25 ± 0.03.

Chandrani Bader [26] reported that the average lateral ventricle volume was significantly larger in normal pressure hydrocephalus (NPH) patients as compared to Alzheimer's disease patients and vascular dementia.

Evan's ratio is also increased in Non Pressure Hydrocephalus. Recently authors have shown the association between ventriculomegaly (ER>0.30) with or without hydrocephalus related symptoms after subarachnoid haemorrhage (cortical atrophy) [27].

Evans index was one of the older ventriculographic indices which represented ventricular volume [28] hence widely used in the diagnosis of idiopathic normal pressure

hydrocephalus, in the assessment of outcome of patients with shunt placement which is the primary mode of treatment [23]. Patients with more than > 0.30 ER may indicate hydrocephalus, also may have one or more components of Balint's syndrome

AUTHOR	YEAR OF PUBLICATION	ETHNICITY	EVANS INDEX
Kosourov AK [29]	2002	RUSSIANS	0.22 ± 0.28
PATNAIK P [30]	2014	NORTH INDIA	0.25 ± 0.04
SARI [31]	2015	TURKISH	0.23 ± 0.28
HAMIDU [32]	2015	NIGERIAN	0.25 ± 0.04
KUMAR S A [33]	2017	SOUTH INDIA	0.27 ± 0.03
NAMARATA [25]	2018	NORTH INDIA	0.25 ± 0.031
JEHANGIR [34]	2018	KASHMIRI	0.26 ± 0.03
PRADHAN A [35]	2021	NEPALESE	0.25 ± 0.035
PRESENT STUDY	2022	NORTH INDIA	0.23 ± 0.02

Table 3. Comparison of Evans Index present study with other studies

CONCLUSION

Ventricular enlargement in adults could be as a result of aging, neurodegenerative diseases, cerebrovascular conditions, tumors and trauma. Evans Index is the most useful quantitative criterion to assess ventriculomegaly or hydrocephalus in today scenario. If the Evans Index ranges from 0.20-0.25 it will be considered normal, if the Evans Index ranges between 0.20 – 0.25 it may indicate ventriculomegaly. If the Evans Index ranges more than 0.30 indicate ventricular enlargement.

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Original Article

ASSOCIATION OF SIX MINUTE WALK TEST WITH SPIROMETRY PARAMETERS IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASES

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ABSTRACT

Introduction: A significant health issue on a global scale is chronic obstructive pulmonary disease (COPD). The gold standard for determining a COPD diagnosis and severity is spirometry. The patient's functional ability is evaluated using the 6MWT, a basic, reliable test. It aids in prognostic prediction and management. The purpose of this study was to determine whether the results of the 6MWT correlated with the patient's clinical and spirometric characteristics. The study also examined whether the six-minute walk distance (6MWD) may serve as a substitute for spirometry in determining the severity of COPD in settings with scarce resources.

Materials and methods: This cross-sectional study was conducted in a hospital. Following the application of inclusion and exclusion criteria, 70 consecutive patients with proven COPD (according to GOLD recommendations) were included in the study. Pre- and post-bronchodilator spirometry tests were used to gauge severity. According to ATS recommendations, 6MWT was then performed and noted. The 6MWT results were associated with the patients' spirometric and clinical data.

Results: It was found that, there was a statistically positive and highly significant ($p<0.01$) correlation between 6minute walk test values and % predicted FEV1, FVC and FEV1/FVC ratio of spirometry in COPD study participants.

Conclusions: This study found a significant positive association between patients' spirometry parameters (%FEV1, FVC, FEV/FVC) and 6MWD. Thus, 6MWT can be used to determine the severity of COPD.

Keywords: Chronic Obstructive Pulmonary Disease, 6-minute walk test, Spirometry

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INTRODUCTION

A significant health issue on a global scale is chronic obstructive pulmonary disease (COPD) [1]. It is a prevalent, preventable, and curable condition marked by enduring respiratory symptoms and airflow obstruction, which are brought on by abnormalities of the airways and/or alveoli, which are typically brought on by continuous exposure to noxious particles or gases. As a patient gets older, their COPD impairment worsens and their lung function declines.

The gold standard for evaluating COPD is spirometry. This test also determines the disease's severity, which aids in management. The six-minute walk test (6MWT) is a clinical marker of functional capacity in individuals with cardiovascular illnesses [2]. It is a moderate intensity exercise test. It is a method that measures someone's ability to carry out activities of daily living realistically. The six minute walk test is used in patients with chronic respiratory diseases such chronic obstructive pulmonary disease (COPD), interstitial lung disease (ILD), pulmonary hypertension (PH), and chronic heart failure to assess exercise performance, track medication, and predict prognosis [3].

It has been tested in many populations for its safety, validity, repeatability, and correlations with a number of physiological markers. An easy test to evaluate a patient's functional capacity is the 6 minute walk test (6MWT) (ability for day to day activities). It costs little to perform the test, and it is consistent. In order to effectively manage COPD, it's crucial to improve the patient's symptoms. According to how severely the airways are obstructed, the management is determined (GOLD stages) [4]. The patient's ability to exercise may or may not be accurately depicted by the patient's spirometric data (FEV1).

It is crucial to understand whether the GOLD severity stages coincide with the patient's functional ability. It is important to know whether the results of the 6MWT correlate with the flow and volume indices of spirometry in this situation. Additionally, a strong connection between Studies have linked different spirometry parameters in COPD with arterial blood gases (ABG), such as oxygen and carbon dioxide. Spirometry is frequently unavailable in rural locations, 6MWT is feasible in certain circumstances [1,5].

The goal of the current investigation was to determine whether the 6MWT might supersede spirometry as a predictor of the severity of COPD by correlating spirometric data with its results. This study aimed to determine if the 6MWT correlated with the patient's spirometric characteristics and whether the six-minute walk distance (6MWD) may serve as a substitute for spirometry in determining the severity of COPD in settings with scarce resources.

The objectives of the study were:\

1) To ascertain the severity of COPD patients based on their spirometry and six minute walk test

2) To find out the correlation between six minute walk test with spirometry parameters

MATERIALS AND METHODS

This cross-sectional study was carried out in the Department of Respiratory medicine, Subharti Medical College from June 2022 to August 2022. The institution's ethics committee granted the project approval. In order to confirm instances of COPD (based on GOLD criteria) arriving at the Respiratory medicine out-patient department, the informed consent was obtained from each patient before commencement of the study. the following inclusion and exclusion criteria were used to decide which patients will participate in the study.

INCLUSION CRITERIA:

- All confirmed cases of COPD
- Age >40 years and less than 75years

EXCLUSION CRITERIA:

- HR >120/mt
- BP > 180/100
- any systemic condition other than COPD

Convenience sampling technique was used and 70 study subjects were taken. Demographic information about the patients (such as age and sex) was recorded.

SPIROMETRY:

According to American Thoracic Society recommendations, it was carried out by a skilled technician. For analysis, the best outcome from three attempts was chosen. 15 minutes after giving a short acting bronchodilator, spirometry was performed once more. The following spirometric measurements were made: FEV1/FVC ratio, FEV1,%FEV1, FVC.

In accordance with GOLD recommendations, patients who had obstructive ventilatory defects were divided into three categories: mild, moderate, severe, and extremely severe.

6MWT:

Following spirometry, 6MWT was performed on a 30-meter stretch (per the ATS recommendation)as follows:

- The patient rested for 10 minutes before the test.

Heart rate (HR), blood pressure (BP), SpO2, and the presence of dyspnea were monitored at baseline. At the conclusion of the test, same parameters were again recorded. meterage was covered in 6 minutes of walking.

- Chest pain, severe dyspnea, lower extremity muscle spasms, or the patient's desire to stop the test all resulted in its termination.
- The patients' post-test was monitored for 15 minutes for any negative effects.

Statistical Analysis:

The data was gathered and analyzed using SPSS version 26. Statistical analysis was carried out using Descriptive statistics and other relevant tests of significance. Pearson's correlation was performed to understand the correlation between the different variables assessed in the study. The value of the correlation coefficient ranges between -1 to +1. Minus one implies that there is inverse relation between the two variables, i.e. an increase in one will cause a decrease in the other variable. Zero value of correlation coefficient implies that there is no relation between the two variables. The p value was set at 0.05 to be significant, and p value less than 0.01 was considered as highly significant. Confidence level was set at 95% and power of the study was fixed at 80%.

RESULTS

Total number of study participants were 70, Three of them were lost to follow up. The overall mean age group was found to be 61.20 in this study. Among the total 67 study participants, 59 (86.8%) were males and 8 (11.8%) were females in this study (Tables 1 & 2).

Table 3 shows that when the 6 minute walk test of the study participants are compared based on them being grouped as per their Gold stage, a highly significant ($p<0.01$) difference is seen in the walk test values. The mean value column shows that the highest value for walk test was seen in the participant in GOLD stage I and the lowest value of walk test was seen in the participant in GOLD stage IV.

Table 4 shows the correlation between the values of the walk test of the participants and the other variables. It was seen that there was a positive, medium and highly significant ($p<0.01$) correlation between the post FVC and 6minute walk test values of the study participants. It meant an increase in the value of walk test also shows a significant increase in the value of Post FVC, moderately. It was found that there was a negative, very weak and non-significant ($p<0.05$) correlation between the post FEV1 and walk test values of the study participants. Meaning that an increase in the value of walk test shows a weak decrease in the value of Post FEV1.

It was observed that there was a positive, medium and highly significant ($p<0.01$) correlation between the FEV1/FVC and walk test values of the study participants. When there was an increase in the value of walk test also shows a significant increase in the value of FEV1/FVC, moderately. It was seen that there a positive, weak and highly significant ($p<0.05$) correlation between the % predicted FEV1 and walk test values of the study participants. That meant an increase in the value of walk test also shows a weak, but significant increase in the value of % predicted FEV1.

Variable	Number	Minimum	Maximum	Mean	Std. Deviation
Age	67	41.00	80.00	61.2090	7.98775

Table 1. Age of the study participants.

Variable		Frequency	Percent
Gender	Male	59	86.8
	Female	8	11.8
	Total	67	98.5

Table 2. Gender wise distribution of the study participants.

GOLD Stage	N	Mean	Std. Deviation	95% Confidence Interval for Mean		Minimum	Maximum	P value
				Lower Bound	Upper Bound			
I	1	453.00	.	.	.	453.00	453.00	0.00*
II	23	369.60	38.667	352.88	386.32	318.00	468.00	
III	32	342.71	31.886	331.22	354.21	303.00	418.00	
IV	12	247.00	37.872	222.93	271.06	180.00	320.00	

Table 3. Intergroup comparison the values of walk test of participants based on GOLD stage.

Pearson's Correlation		Walk Test	Post FVC	Post FEV1	FEV1/FVC	Percentage predicted FEV1
Walk test	Pearson Correlation	1	.549**	-.087	.459**	.230
	P Value		.000**	.481 (NS)	.000**	.05*
	N	68	68	68	68	68

Table 4. Pearson's Correlation between different variables assessed in the study.

DISCUSSION

Severity of a diseases should be diagnosed in order to effectively treat and manage COPD patients. Mostly now a days severity is assessed by post-bronchodilator FEV1 (%predicted) based on GOLD guidelines. 6MWT can be used as a crucial evaluating tool in catagorizing severity of COPD where spirometry is not possible or unavailable. The present study found significant correlation of 6MWD with spirometric and clinical indices like % predicted FEV1, FVC, FEV1/FVC ratio.

Correlation with 6MWD:

% FEV1: In the current investigation, there was a statistically significant connection between % predicted FEV1 and 6MWD (p=0.00**). Similar correlations between FEV1 and 6MWD have also been discovered in a number of earlier investigations [5-7]. But a research by Chauhan et al. discovered a contrary outcome [8].

FVC: The current study found a highly significant (p.001) positive connection between FVC and 6MWD. Similar findings of the connection between 6MWD and FVC were also found by other studies [6,7,9,10]. Three researches revealed an association with FVC in additional [6,7]. No such association was established in one study by Kodawala et al. [11].

FEV1/FVC: The FEV1/FVC ratio and 6MWD significantly correlated in this study (p .01). Similar outcomes have been discovered in a few investigations [7]. However, there was no correlation between 6MWD and the

FEV1/FVC ratio according to Kundu et al. and Nagshin et al. [7,12].

CONCLUSION

As per the results obtained after statistical analysis of this study, there exists a significant positive association between patients' spirometry parameters (%FEV1, FVC, FEV/FVC) and 6MWD. Thus, 6MWT can be used as an effective measure to determine the severity of COPD.

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Review Article

OVERVIEW AND MYSTERIES OF CARDIOMYOPATHY: AN INTRODUCTION

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ABSTRACT

Numerous complicated and diverse genetic variables that are heterogeneous all contribute to cardiomyopathy. Depending on the definition and location, different areas have different rates of cardiomyopathy. Cardiovascular disease is the most common inherited cause of cardiomyopathy. Other variables that contribute to the progression of cardiomyopathy include coronary heart disease and high blood pressure. The investigation of the relationship between cardiomyopathy and its genetic variations with biomarker is the major goal of this study. The pathophysiology and development of cardiomyopathy are significantly influenced by a few new genes linked to human hereditary cardiomyopathy. Human gene mutations and data compiled from several databases have revealed that various genes have been linked to cardiomyopathy, explaining the susceptibility of the illness. Our findings contribute to a better understanding of the genetic component with biomarker of cardiomyopathy and will help to better understand how the disease mode influences prognosis. Furthermore, improved understanding of molecular pathophysiology of genetic cardiomyopathy may open the framework for the growth of personalized therapies in the future. A structural or functional abnormality of the myocardium is a hallmark of cardiomyopathies, which are heart disorders. There are several kinds and sub kinds, some of which have a significant genetic component. Medical and genetic advancements have improved our understanding of cardiomyopathies. This article discusses the classification, pathogenesis, and biomarker presentation of the major cardiomyopathies.

Keywords : Cardiomyopathy, Genetic variations, Biomarkers, Human gene mutations

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INTRODUCTION

Injuries to the myocardium are referred to as cardiomyopathies (the heart muscle). Scar tissue and increased heart size, thickness, and hardness are all possible effects of cardiomyopathy. As a consequence, your heart has been unable to effectively pump more blood to an entire body. A wide range of hereditary and non-genetic etiologies can cause cardiomyopathy, which is a serious clinical disorder characterized by structural and functional myocardial abnormalities that prevent blood ejection from the ventricles or ventricular contraction. Left ventricular systolic dysfunction and distortion can also be present, and these signs might be explained by aberrant load circumstances or coronary artery disease. Cardiomyopathy is regarded as a significant cardiovascular illness due to its rising frequency and high mortality.

Throughout the course of the disease, it is linked to a number of outcomes, such as hospitalization, deadly arrhythmias, and death. Cardiomyopathy is a clinical condition marked by frequent patient complaints and abnormal physical examination findings brought on by ventricular failure. The term has a wide range of expressions, making its handling difficult. Numerous illnesses, including cardiac failure, hereditary conditions, and systemic illnesses, can lead to cardiomyopathy. It is possible for cardiomyopathy to be primary (i.e., inherited, mixed, or acquired) or secondary (eg, infiltrative, toxic, inflammatory). Dilated cardiomyopathies, hypertrophic cardiomyopathies, restricted cardiopathies, and arrhythmic right ventricular cardiopathies are the main forms.

Although early stages of cardiomyopathy are asymptomatic, symptoms such as weariness, coughing up blood, orthopnea, and paroxysmal shortness of breath are all identical to the ones seen in any symptomatic type of disease failure. Breathing difficulties and swelling at night. B-type natriuretic peptide levels, baseline serum chemistry, electrocardiography, and echocardiography have all been used in clinical parameter. Targeted therapy alleviating cardiomyopathy symptoms and lowering mortality and hospitalization rates associated with heart failure. Heart transplantation, cardiac resynchronization therapy, implanted cardioverter-defibrillators, and medication are among the available treatments. Restricting alcohol use, eating a low-sodium diet, exercising, decreasing weight, and quitting smoking are all suggested modifications to lifestyle.

Dilated cardiomyopathy

When aberrant lading circumstances (increased blood pressure or volume) or coronary roadway complaint, where an ischemic cardiomyopathy may crop, cannot explain for the heart failure, that's the most common factor of heart failure (Weintraub

et al., 2017), DCM is honored (Elliott et al, 2008). DCM is much more common for men and therefore can appear at any age. It accounted for around 60percent of all child cardiomyopathy cases. The term refers to a group of different diseases marked by abnormal ventricular dilatation or ventricular hypertrophy (thickening of the ventricle wall)(with thinning and blowup).

It develops gradationally and can affect in decompensated cardiac failure (Weintraub et al., 2017). It's a current cause for demanding a heart transplant in the industrialized world (Maron et al, 2006). A myocardium-related issue may be the root of DCM. As according to Taylor et al. (2006), familial DCM is the term used when the illness is hereditary in 20–48% of cases. Gene abnormalities affecting the cytoskeleton, mitochondria, ion channels, and structural components of heart muscle cells. The most common causes in adults are dilated cardiomyopathy (CAD, ischemic cardiomyopathy), high blood pressure, and other factors like viral myocarditis, valvular disease, and genetic susceptibility.

The most likely causes of dilated cardiomyopathy in children are spontaneous myocarditis and neuromuscular abnormalities, which often manifest in the first year of life. Children with neuromuscular conditions similar Duchenne muscular dystrophy, Baker muscular dystrophy, and Barth's pattern, an X-linked inheritable condition that causes dilated cardiomyopathy, cadaverous myopathy, and neutropenia, can develop cardiomyopathy. There are more than 500 unique transmutations in 11 mutant genes that cause hypertrophic cardiomyopathy. 16 The myosin-binding protein C and beta-myosin heavy chain are involved in the most typical variant. Not all individuals with a genetic hypertrophy cardiomyopathy defect show indications. This is more likely due to the diversity of phenotypes associated with hypertrophic cardiomyopathy rather than an effect of the environment or other genetic modifiers.

A rare form of restrictive cardiomyopathy develops when the ventricles become incapable of contracting. Often, infiltrative processes including sarcoidosis, hemochromatosis, amyloidosis, and desmin anomalies cause this (a protein marker found in sarcomeres). Restrictive and hypertrophic cardiomyopathy are caused by a troponin mutation in one of the family types of restrictive cardiomyopathy. A hereditary condition of the right ventricle's muscle known as arrhythmogenic right heart cardiomyopathy is autosomal dominant. Syncope, ventricular arrhythmia, cardiac failure, or—less frequently—sudden death might result. In arrhythmogenic right heart cardiomyopathy, fatty and fibrous tissue replaces the myocardium. This leads to pathologic abnormalities that damage the heart. The left

ventricle may be impacted by the same infiltrative mechanism.

Additionally, peripartum (or postpartum) cardiomyopathy and alcohol-related cardiomyopathy may be seen by family physicians. An uncommon form of myocarditis, peripartum cardiomyopathy frequently develops during the third trimester of gestation or within the first five ensuing months delivery. Multiparous women over 30 year who are fat and have endured preeclampsia are more likely to have it. Alcoholism can also cause a dilated cardiomyopathy, which may be treatable by quitting drinking. DCM may also develop as a result of systemic conditions such inflammation, malnutrition, and autoimmune, endocrine, or viral illnesses.

In high-income nations like the UK, alcohol abuse accounts for 21–36% of cases. Binge drinking raises the risk of developing DCM, which is driven by a variety of susceptibility factors, including racial and genetic ones. About 80% of those with DCM have heart failure symptoms include orthopnea, paroxysmal nocturnal dyspnea, dyspnea, tiredness, and chest discomfort. Also, they could have clinical pointers of a systemic underpinning aetiology.

It's pivotal to gain a thorough medical and family history, as well as information about any once contagion infections, medicine operation, and alcohol consumption, in order to identify any underpinning causes. On examination, the cardiac nib beat may be mislaid as a development of ventricular dilatation, and congestive heart failure symptoms similar as blown legs from supplemental and/ or holy oedema, crackles from pulmonary traffic, and blown neck modes from amplified inward jugular venous tension may also be present. Congestive cardiac failure can create an additional heart sound (S3) that causes a "gallop rhythm," or a dilated left ventricle can cause characteristics of mitral regurgitation. Both of these conditions can be detected during auscultation.

Hypertrophic cardiomyopathy

With a frequency of 0.2 in the overall population, HCM has entered mindfulness on a worldwide scale since it was first linked in eight cases at St. George's Sanitarium in London who held asymmetrical cardiac septal thickening (hypertrophy) of the left ventricle in 1957. (Houston and Stevens, 2015). Patients could have sudden cardiac death. Left ventricular hypertrophy and, occasionally, blockage of the left ventricular outflow tract are features of the diverse condition known as HCM (Houston and Stevens, 2015). Familial illness is the condition's primary aetiology in 60% of adults and adolescents (Marian and Braunwald, 2017).

Multitudinous inheritable mutations in HCM have been linked, some of which disrupt pivotal sarcomere- performing proteins (a

sarcomere is an introductory unit of repeating contractile proteins that make up muscle cells). Although autosomal and coitus- linked sheepish patterns have also been observed, autosomal dominant heritage is the typical mode of heritage for these gene abnormalities (Braunwald, 2017). For 70- 80 of all cases of heritable HCM, gene abnormalities may include the- myosin heavy chain gene, myosin- binding protein C, and troponin T. (Marian and Braunwald, 2017; Sisakian, 2014).

Some people may have more severe illness if they have more than one gene defect inherited. Metabolic or neuromuscular illnesses brought on by genetic issues account for 5 to 10% of additional causes of HCM (Houston and Stevens, 2015). Non-genetic reasons include amyloidosis, a rare disorder in which the aberrant protein amyloid builds up in the heart (Elliott et al, 2014). In HCM, age is a crucial indicator since inherited metabolic or neuromuscular reasons are more prevalent in newborns and babies than in older children and adults (Elliott et al, 2014). The heritage pattern of the illness can be defined by reconstructing an inheritable history. Important factors include

1. A history of unforeseen heart death in the family
2. Undiagnosed heart failure or arrhythmias
3. Symptoms of a systemic underpinning cause.

Some people show little symptoms, while others may have blackout, pulsations, dyspnea, and/ or casket discomfort. Even in the absence of any prior symptoms, HCM patients are nevertheless at risk for sudden mortality (Houston and Stevens, 2015). Given that not all patients have left ventricular outflow blockage brought on by a hypertrophied ventricle, an examination may not always detect anything wrong. When the sole of the hand is put on the left parasternal area (side of the sternum), possible symptoms include a significant para-sternal lift; if the hand rises off the chest wall with each heartbeat, this indicates a prominent anteroposterior lift and may indicate ventricular hypertrophy.

A patient's neck veins may swell due to increased jugular venous pressure. When the heart's apex beat is palpated, a stronger left ventricular apical impulse or, less frequently, a systolic thrill may be felt. A pan-systolic murmur brought on by mitral valve regurgitation is another possibility. Another murmur may be present, which is mid-systolic with a crescendo-decrescendo sound and is brought on by turbulent flow via the outflow tract.

Restrictive Cardiomyopathy

RCM is suspected when individuals exhibit near normal systolic function but diastolic dysfunction on echocardiography. RCM is characterised by ventricular stiffness directing to decreased ventricular padding and diastolic quantity during the cardiac circle. Unlike some other cardiomyopathies, which are identified by morphological alterations in the ventricular, RCM is identified by the hemodynamic issues that ensue from it (Sisakian, 2014).

It accounts for 5% of paediatric cardiac diseases and is the least prevalent cardiomyopathy 1 (Muchtar et al, 2017). RCM has a number of reasons, although in 50% of cases there is no known cause (Muchtar et al, 2017). In discrepancy to other kinds of RCM, endomyocardial fibrosis is much more common in tropical and sub-Saharan African nations, including Cameroon (Muchtaretal., 2017; Cheloetal., 2015).

As a result, these cultural groups are more prevalent to experience these types of RCM than others. Amyloidosis, sarcoidosis, and hemochromatosis are more prevalent causes of RMC in other areas (Muchtar et al, 2017). Endomyocardial fibrosis, for example, may be the root cause of RCM. Additionally, it could answer to RCM may have an underlying main cause, such as endomyocardial degeneration. It may also be secondary to:

1. Other systemic conditions, such as amyloid, sarcoidosis, and radiation effects, that produce myocardial invasion;
2. Conditions that lead to aberrant loading inside the cardiac cells, such as Fabry disease (induced by buildup of globotriaosylceramide), glycogen storage disorders, or hemochromatosis (an iron overload syndrome)
3. Additional cardiomyopathies producing a pathogenesis that is restricted. Peripheral oedema, increased jugular venous pressure, and gallop rhythm are only a few examples of symptoms and indicators of congestive heart failure that may be present in RCM along with elements of an underlying systemic illness.

Arrhythmogenic cardiomyopathy

In 1700, a family with a specific right ventricle dilation was found to have this hereditary cardiomyopathy for the first time (Braunwald, 2017). Ever since, there have been several accounts of people who suffer from the illness, which is characterised by the replacement of ventricular muscle by fibrofatty tissue. ACM was previously classified as arrhythmogenic right ventricular cardiomyopathy, however it has now been shown that up to 75% of individuals also have left ventricle involvement (Sisakian, 2014; Falase and Ogah, 2012).

Due to electric instability and consequent ventricular tachycardia or ventricular fibrillation, the disease is a significant contributor to sudden cardiac death (Sisakian, 2014). Pulsations or blackout; Signs of ventricular failure (similar as ascites, hepatic

traffic, elevated jugular venous pressure, and significant oedema); and life- hanging arrhythmias are all symptoms of ACM.

Other cardiomyopathies

Peripartum cardiomyopathy

Cardiomyopathy during pregnancy a uncommon, potentially fatal illness known as peripartum cardiomyopathy can develop up to six months following birth and usually occurs in the final pregnancy month. It has clinical characteristics with dilated cardiomyopathy (DCM), including as systolic dysfunction and ventricular enlargement. Since cardiomyopathy shares many traits with those other types of systolic heart failure, a diagnosis is really only determined when all other potential causes have been ruled out. If peripartum cardiomyopathy occurs in a woman without pre-existing heart failure or any other known cause, she may be given this diagnosis. One theory for the poorly known pathophysiologic is that prolactin may contribute to oxidative damage (Honigberg and Givertz, 2019).

Stress-induced cardiomyopathy

Intense mental or physical stress is frequently the precursor to stress-induced cardiomyopathy, or takotsubo cardiomyopathy, with possible catecholamine release including adrenaline and noradrenaline. Additionally, postmenopausal women's oestrogen deficiency has been linked. On echocardiography, the complaint is distinguished by a hyperdynamic left ventricular member and an irregular systolic shape suggesting an octopus trap (called takotsubo in Japanese).

The apex of the heart may thus inflate, still this condition isn't duly regarded as a DCM because it presents with distinct clinical characteristics. Left ventricular contractile dysfunction and related ST elevation may be seen on an ECG. To evaluate the coronary arteries and rule out myocardial infarction, many patients may require an angiography. The morphological and functional alterations to the heart in stress-induced cardiomyopathy can be reversed. With the use of nitrates and diuretics in treatment plans intended to prevent life-threatening consequences, they may go away in a matter of days or weeks (Kato et al, 2017).

Left ventricular non-compaction

As according to Nunez- Gil and Feltes-Guzmán(2012), spongy myocardium, also known as left ventricular non-compaction, is a rare natural cardiomyopathy. It generally affects the crest of the heart and is characterized by an altered myocardium walls with expansive trabeculae (irregular muscular column extending from the inner face of the heart) with deep intra-trabecular recesses, which results 1in a thickened myocardium with two layers (one non-compacted subcaste and one thin compacted subcaste). The left ventricular depression continues into the deep intra-trabecular recesses, which refill with

blood from the ventricular depression but show no substantiation of communicating with the epicardial coronary roadway network (Attenhofer- Jost and Connolly, 2019). Heart failure, arrhythmias, and embolic events are among the complications (Nunez- Gil and Felt).

Histiocytoid cardiomyopathy

Left ventricular non-compaction, commonly referred to as spongy myocardium, is a relatively rare form of congenital cardiomyopathy (Nunez-Gil and Feltes-Guzmán, 2012). Histiocytoid cardiomyopathy, also known as Purkinje cell hamartoma, is an unusual cardiomyopathy that often affects females and appears between birth and the age of four. It typically affects the apex of the heart and is recognised by an altered histogram.

It is associated with congenital heart defects, arrhythmias, and abrupt cardiac death. Extra-cardiac symptoms including issues with the nervous system and eyes may also be present. Study to affect from a Purkinje cell (an element of the heart's conduction system) experimental abnormality, histiocytoid cardiomyopathy may also be caused by large quantities of inaptly shaped mitochondria seen in cardiac towel (Shehata et al, 2015).

CONCLUSION

Cardiomyopathies patients may have a variety of symptoms or none at all. It is crucial to collect a thorough clinical history of their current symptoms as well as pertinent information about their medical background, prescription usage, family history, and alcohol consumption.

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Case Report

UNILATERAL COLPOCEPHALY WITH BILATERAL PARTIAL AGENESIS OF CORPUS CALLOSUM IN ADULT MALE: A CASE REPORT

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ABSTRACT

Colpocephaly, a rare congenital brain abnormality characterized by disproportionate enlargement of the posterior horn of the lateral ventricles, typically presents with neurological deficits in infancy. We present a unique case discovered incidentally during routine cadaveric dissection of a 63-year-old male with no apparent symptoms. The brain exhibited massive colpocephaly, accompanied by bilateral partial agenesis of the corpus callosum.

Morphometric analysis revealed significant enlargement of the left lateral ventricle, with an anterior-to-posterior ratio indicative of colpocephaly rather than normal pressure hydrocephalus. Comparative studies with non-colpocephalic brains corroborated these findings. Literature review suggests a developmental origin for colpocephaly, possibly related to disturbances in hydrostatic balance during embryogenesis.

Previous reported cases of adult-onset colpocephaly underscore its rarity and diagnostic challenges. Understanding the distinctive morphometry of colpocephalic lateral ventricles is crucial for accurate diagnosis, especially to differentiate it from more common conditions like idiopathic normal pressure hydrocephalus, thus avoiding unnecessary interventions. This case highlights the importance of cadaveric studies in uncovering rare anatomical variations and expanding our knowledge of neurological conditions.

Keywords : Colpocephaly, Morphometric analysis, Corpus callosum agenesis

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INTRODUCTION

Colpocephaly is a rare congenital abnormality in the ventricular system of the brain. It is characterized by disproportionate enlargement of the posterior horn of the lateral ventricle as compared to the anterior horn. Other neurological malformations, particularly agenesis of the corpus callosum and microgyria, are associated with this condition [1]. It can be differentiated from hydrocephalus, where there is proportionate ventriculomegaly of the horns of the lateral ventricles [1]. The radiological diagnosis is usually made in the prenatal period and later manifests as intellectual disability [2].

CASE REPORT

In routine dissection for undergraduates at Government Doon Medical College, Dehradun, Uttarakhand, King George Medical College, Lucknow, and CDSIMER, Harohalli, Ramnagara district from the period of 2020 to 2023, a total of 20 sagittal sections of brains were examined. During brain removal after removing the calvaria, a striking case of massive colpocephaly with small cerebral white matter in the parietal and occipital lobes of the left cerebral hemisphere, along with bilateral partial agenesis of the corpus callosum, was incidentally reported in a 63-year-old male cadaver who was otherwise a functional male and had a natural death at CDSIMER, Harohalli, Ramnagara district in 2021, as reported by his death certificate. The rest of the 29 brains were found to have normal anatomy of lateral ventricles. To our best knowledge, this is the first cadaveric reported case in an asymptomatic adult and is described in the cadaveric literature.

Morphometric analysis of the colpocephalic sagittal section of the brain was conducted using an inch tape. Various parameters such as anteroposterior length of the anterior and posterior horns and body of the lateral ventricle, and height (superoinferior length) of the body of the left ventricle were measured with an inch tape in sagittal and transverse sections of the brain. The posterior-to-anterior (P/A) ratio was also calculated by taking the maximal width of the posterior horn and dividing it by the maximal width of the anterior horn of the lateral ventricle in the transverse section of the left cerebral hemisphere.

RESULTS

The right cerebral hemisphere of this cadaveric male seems to have had normal anatomy except for partial agenesis in the center of the body of the lateral ventricle. However, in the left cerebral hemisphere, massive disproportionate enlargement of the lateral ventricle was observed, with an anterior-posterior length of 13.2 cm and superoinferior length (height) of 6.5 cm, resulting in a P/A Ratio of 3.1 (>3). The maximal width of the posterior and anterior horn was found to be 4.96 cm and 1.6 cm, respectively, which highly suggests the case of colpocephaly rather than normal pressure hydrocephalus [3]. (Figs. 1-4)

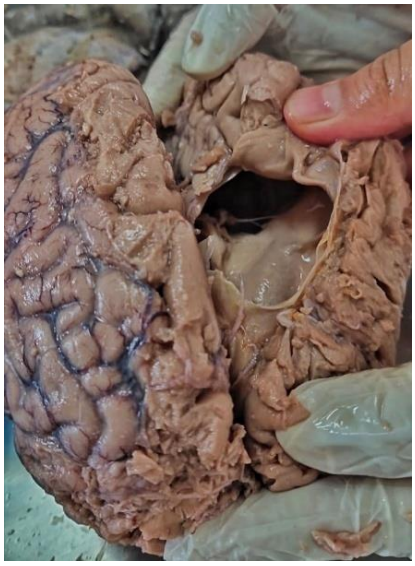

Fig. 1. Case of colpocephalic brain (intact right and left cerebral hemisphere) in routine dissection

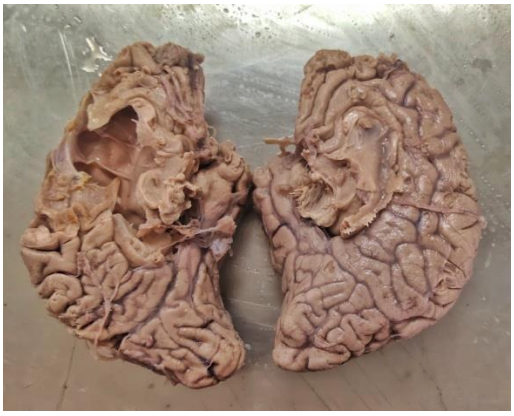

Fig. 2. left and right cerebral hemisphere showing Massive colpocephaly on left side and bilateral partial agenesis of corpus callosum on right side

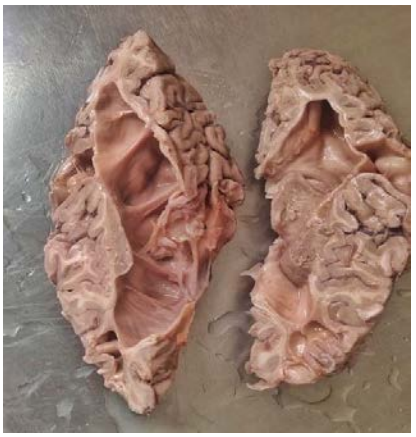

Fig. 3. Transverse section of left cerebral hemisphere showing massive colpocephaly showing the maximum width of posterior and anterior horn measurement

Fig. 4. Measurement of length of posterior horn of left cerebral hemisphere

DISCUSSION

Colpocephaly is typically discovered in infancy due to associated intellectual disability, seizures, motor abnormalities, or visual abnormalities [4]. Discovery in adulthood is remarkably uncommon. Colpocephaly can be identified radiographically by measuring the maximal width of the anterior and occipital horns of the lateral ventricles. An occipital-to-anterior horn ratio of greater than 3 is highly specific for colpocephaly, although it has relatively low sensitivity [5].

According to Benda et al.'s study, intermediate zone fibers originating from the thalamus and corpus callosum in vesiculocephaly fail to develop at the end of the fifth embryonic month, and its architectonic appearance suggests colpocephaly [6]. Yakovlev et al. stated that colpocephaly results from a disturbance in the hydrostatic balance between the intra- and extraventricular pressures as a consequence of failure of the development of the cerebral wall, resulting in outpocketing of the ventricular wall. Their study also stated that other anomalies seen in association with colpocephaly suggest an insult not later than the second embryonic month [7].

Noorani et al. in their CT study of 14 cases of colpocephaly in a series of 3,411 consecutive CT scans in the 1988 California population found the P/A ratio as 2.90±1.44, which almost approximates our findings. This study also stated that periventricular leukomalacia, which results from the destruction of the optic radiations and subsequent degeneration in the white matter of the occipital lobe, could be the possible explanation for the development of disproportionately enlargement of the occipital horns of the lateral ventricles [8].

Honnegowda Tm et al. reported a mean anteroposterior length of the body and frontal horn of the lateral ventricle in non-colpocephalic brains as 7.6 cm and 3.0 cm, respectively, in their CT study of the brain, which is close to our findings, thereby proving that in the present study, the defect was present only in the posterior horn, suggesting more of colpocephaly [1].

C Gyldensted et al. found the width of the left anterior horn as 1.9 cm in the CT study of non-colpocephalic brains, which approximates our finding, thereby proving that no abnormality is present in the anterior horn. Therefore, it proves our hypothesis that the present case was of colpocephaly, which does not involve anterior horns [9].

Duffner F et al. in their MRI study for non-colpocephalic brains, found the mean total length (anteroposterior) of the lateral ventricle, posterior horn, and height of the lateral ventricle as 9.1 cm, 2.8 cm, and 1.7 cm, respectively, which are not found to be in unison with our findings (13.2, 4.2 cm, and 6.5

cm respectively), suggesting that in our present case of the brain, dimensions found were abnormal, proving the hypothesis of colpocephalic brain [10].

Previously reported cases of colpocephaly were diagnosed incidentally in adulthood during CT examination post-onset of mild neural symptoms in Wunderlich G, et al. in 1996 [11], Cheong J, et al. in 2012 [12], Esenwa C, et al. in 2013 [13], Brescian N, et al. [14], Nasrat T, et al. in 2014 [15], Bartolome E, et al. in 2016 [16].

CONCLUSION

Colpocephaly discovered in asymptomatic adults is exceedingly rare. It may be misdiagnosed as normal pressure hydrocephalus. Knowing the respective morphometry of the lateral ventricle can aid clinicians in differentiating this disproportionate ventriculomegaly affecting the posterior horn and body of the left lateral ventricle in a colpocephalic brain from that of the common form of adult ventriculomegaly (idiopathic normal pressure hydrocephalus) and thereby preventing unnecessary interventions.

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Case Report

ACCESSORY SUBSCAPULARIS MUSCLE COMPRESSING POSTERIOR DIVISION OF UPPER TRUNK: A RARE PRESENTATION

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ABSTRACT

Presence of additional or accessory muscles near the axilla can lead to compression of vital structures of the axilla. Opposite conventional thoughts, it seems that the subscapularis muscle (SM) is the most variable muscle of the rotator cuff group. Accessory Subscapularis muscle is one of the rare variants of the Subscapularis muscle. Presence of this variant (ASsm) can cause abnormal clinical presentation. During routine dissection of the axilla in a female cadaver in the Department of Anatomy, Muzaffarnagar Medical College, we found an additional slip or accessory subscapularis muscle, arising from the anterolateral part of the Subscapularis and running upward and medially, finally attached to the coracoid process (palpated tip). During its course, it passed through the Brachial plexus and caused compression of the posterior division of the Upper trunk. This type of accessory slip or accessory subscapular muscle can cause compression neuropathy, or this accessory slip can be used during the repair of a ruptured Subscapularis or any other adjacent muscle.

Keywords: Accessory Subscapularis Muscle, Rotator Cuff Variants, Brachial Plexus Compression

INTRODUCTION

The subscapularis, forming the anterior part of the rotator cuff of the shoulder, is a multipennate muscle causing internal rotation of the shoulder joint [1]. Contrary to the belief that the subscapularis muscle was devoid of variation (Pires et al., 2017), the subscapularis gained a reputation for its variations in terms of its number of bellies, tendon, and insertion or communication with nearby musculature. One of the rare variations of the Subscapularis muscle (SsM) is the presence of Accessory Subscapularis

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shoulder region such as the lesser tuberosity, shoulder joint capsule, or fusion with nearby musculature [3]. The presence of ASsM is clinically important because the muscle fibers of ASsM can cause compression of neurovascular structures in the axilla, depending especially on its mode of insertion. It may cause clinical presentations resembling quadrangular space syndrome, making the presence of ASsM and its study clinically relevant.

OBSERVATIONS

During routine dissection of the left axilla in a female cadaver for medical undergraduate teaching according to the given protocol at the Anatomy Department of Muzaffarnagar Medical College, we noticed the presence of an accessory slip of SsM. A small muscle belly bridging in front of the posterior division of the upper trunk was found. On further tracing, these fibers were arising from a tendinous origin from the anterolateral aspect of the Subscapularis, and distally, ASsM was inserted into the coracoid process in the form of muscular fibers. To fully display ASsM, the middle third of the clavicle was resected (Fig. 1). In this course, the upper part of ASsM was crossing the posterior division of the upper trunk.

DISCUSSION

Musculature around the shoulder joint and in the axilla is full of variations. Kameda [4] noticed an additional muscle in 10 out of 380 upper limbs (2.6%) that may cause compression of the nearby neurovascular bundle. The Subscapularis, one of the most important muscles contributing to the Rotator Cuff, is well known for its variations in terms of its origin, number of bellies, and their insertions at different points near the shoulder joint.

Zielinska et al. [5] observed 66 specimens of the Subscapularis and proposed a classification and categorizing the subscapularis into 9 types based upon the number of bellies of the subscapularis, its tendon, and insertion. With this classification of the subscapularis, authors consider the presence of ASsM and suggest that during dissection of the Axilla attention must be paid during clearing of Fascia and cleaning of the long head of the bicep brachii to avoid the removal of any Accessory Subscapularis muscle (A.S.M.) – A rare variation of the Subscapularis.

In the present case, ASsM originated from the anterolateral aspect of the scapula in a usual pattern as described by authors reported ASsM Zielinska et al. [6], and Yoshinaga et al. [7]. Usually, the intermediate belly is fleshy and the point of insertion frequently varies.

In most cases, it is inserted into the lesser tuberosity [5]. Yoshinaga et al. [7] reported ASsM in which the tendinous insertion was fused with the capsule of the shoulder joint.

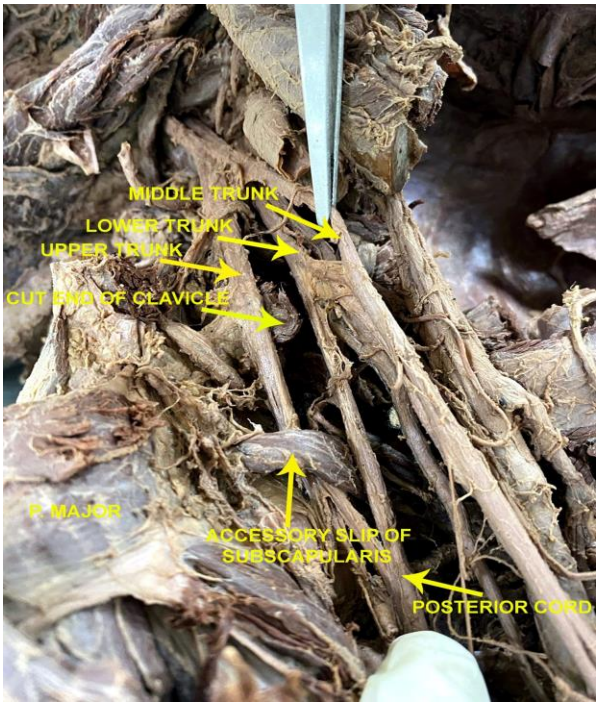

Fig. 1. Case of an accessory slip of the Subscapularis muscle (ASsM)

Kellam et al. [8] reported this part of the muscle fused with another muscle such as the latissimus dorsi or teres major. MacAlister [9] defined two types of ASsM: a subscapulo-capsularis muscle and a subscapulo-humeral muscle. In the present case, ASsM is surprisingly inserted in the form of muscular cylindrical fibers into the coracoid process of the scapula, and this type of variation of the insertion of ASsM is seldom reported. Before insertion into the coracoid process, this muscle passed through the Brachial plexus and caused compression of the posterior division of the Upper trunk.

Due to this variation in insertion of the ASsM, it can cause compression of neurovascular structure in the Axillary region, especially the posterior cord and related structures. Krause and Youdas [10] reported ASsM associated with quadrilateral space syndrome. Zielinska et al. [5] also reported the origin of ASsM by two tendinous heads, one from Subscapularis and one from Teres major, and division into four slips at its second, third, and fourth slips of which were inserted into the base of the coracoid process. This type of insertion causes the compression of the posterior cord.

The author claimed that this is the first reported case of ASsM where the insertion of the point of insertion is the coracoid process; that means the present case can be considered the second case in this sequence where Accessory Subscapularis muscle is inserted into the coracoid process. Insertion of ASsM into the coracoid process is itself a rare variety of this muscle, and probably

chances of compression of the posterior cord, its forming divisions, or branches increases in this type of ASsM because the direction of this accessory muscle moves forward, and that may present with the weakness of musculature around the shoulder joint or pain and numbness in a specific region.

Mann et al. [11] claimed by meta-analysis of 46 studies in 2166 shoulders, the pooled prevalence of accessory Subscapular Muscle as high as 24.6%. Conventional thinking was that the SsM is formed after the ninth week of intrauterine development as a muscle mass is formed and differentiates itself to form the latissimus dorsi, teres major, and subscapularis muscles sequentially may be the inferior portion of the SM is detached, in order to form the ASsM incidentally.

Theory is replaced by a new concept that states that those muscles which are derived from the dorsal muscle mass of the upper limb bud, at the fifth week of development, when myogenic precursors start migrating to form large myoblasts condensations into dorsal and ventral, which will give origin to the muscles of the dorsal and ventral aspect of the limb bud, respectively.

CONCLUSION

The subscapularis muscle, one of the chief members of the rotator cuff, is known for its variations, and Accessory Subscapularis Muscle (ASsM), also known as Subscapularis secundus, one of the rare variations of the subscapularis, may be inserted into the capsule of the shoulder joint, lesser tuberosity, and recently reported in the coracoid process. This kind of ASsM can cause compression of the axillary nerve structure related to the posterior cord or neurovascular bundles, leading to the weakness of nearby structure or brachial plexus entrapment neuropathy or leading to quadrangular space syndrome.

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Book Review

NETTER'S MOVING ANATOME: AN INTERACTIVE GUIDE TO MUSCULOSKELETAL ANATOMY, 1st EDITION

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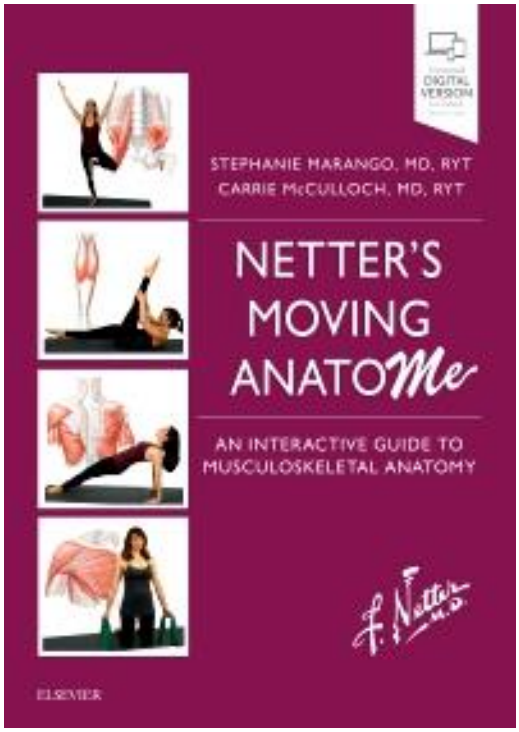

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INTRODUCTION

"Netter's Moving AnatoME, 1st Edition" is a groundbreaking addition to the realm of medical anatomy education. Departing from traditional static textbooks, this innovative resource employs animation, interactivity, and 3D technology to bring anatomy to life. This extensive review assesses the book's educational value, chapter by chapter, offering insights into the quality of both text and dynamic images.

REVIEW

This book is an extraordinary resource that redefines the way we explore and understand human anatomy. This groundbreaking book combines the brilliance of Frank H. Netter's iconic illustrations with cutting-edge interactive technology, creating an immersive learning experience like no other. The book's innovative approach allows readers to delve deep into the intricacies of musculoskeletal anatomy through interactive 3D models, animations, and engaging visualizations.

What sets this book apart is its ability to cater to various learning styles. Whether you're a medical student, healthcare professional, or anatomy enthusiast, the interactive elements provide a dynamic and comprehensive understanding of the subject matter. The detailed and accurate illustrations by Netter, renowned for their clarity and precision, are seamlessly integrated with interactive features, making complex anatomical concepts accessible and engaging.

The user-friendly interface and interactive tools empower readers to interact with anatomical structures, rotate them in 3D, and explore their functions, enhancing both learning and retention. Moreover, the book's intuitive design ensures a smooth navigation experience, allowing readers to focus on the content without any technical hurdles.

In summary, "Netter's Moving AnatoME" is a game-changing educational tool that revolutionizes the study of musculoskeletal anatomy. It is a must-have for anyone seeking a comprehensive, interactive, and visually stunning guide to the human body's intricate structure.

CHAPTER-WISE ANALYSIS

Chapter 1: Introduction to Dynamic Anatomy

The introductory chapter aptly sets the stage for the dynamic journey ahead. The text effectively introduces the concept of dynamic anatomy and provides clear instructions on navigating the interactive elements. This initial chapter serves as a crucial orientation for readers, ensuring they are prepared to maximize their learning experience.

Chapter 2: Skeletal System

The skeletal system chapter provides a captivating exploration of bones and joints.

The textual content is well-structured, offering comprehensive explanations of skeletal structures and functions. The dynamic 3D models and animations of bones and joints are exceptional, allowing users to manipulate and explore these structures from various angles. This chapter is a testament to the power of dynamic technology in enhancing anatomical understanding.

Chapter 3: Muscular System

In the muscular system chapter, the book excels in elucidating muscle anatomy and function. The textual content is informative and engaging, complemented by interactive 3D models and animations that effectively demonstrate muscle actions and interactions. Users can appreciate the dynamism of muscles in motion, making this chapter a standout for its educational innovation.

Chapter 4: Cardiovascular System

The cardiovascular system chapter offers an immersive exploration of the heart and blood vessels. The textual explanations are thorough, and the dynamic 3D models and animations of the heart's chambers, valves, and blood flow are exceptional. Users can visualize and interact with the intricacies of the cardiovascular system, fostering a deeper understanding of cardiac anatomy and physiology.

Chapter 5: Respiratory System

In the respiratory system chapter, the book provides an engaging journey through lung anatomy and respiration. The text is informative, and the interactive 3D models and animations of the respiratory tract and alveoli are visually impressive. Users can witness the dynamic process of breathing in action, enhancing their comprehension of this vital system.

Chapter 6: Digestive System

The digestive system chapter offers a captivating exploration of gastrointestinal anatomy and function. The textual content is comprehensive, with interactive 3D models and animations that vividly depict the structure and peristalsis of the digestive tract. Users can appreciate the dynamic nature of digestion, making this chapter an educational highlight.

Chapter 7: Nervous System

The nervous system chapter excels in simplifying complex neural structures. The text offers clear explanations of the brain and spinal cord, supported by interactive 3D models and animations that allow users to explore neural pathways and functions. This chapter is a valuable resource for comprehending the intricacies of neuroanatomy.

Chapter 8: Urinary System

The urinary system chapter offers an insightful exploration of kidney anatomy and renal function. The text effectively explains urinary structures, accompanied by interactive 3D models and animations that illustrate

filtration and urine formation. Users can interact with the dynamic components of the urinary system, enhancing their grasp of renal physiology.

Chapter 9: Reproductive System

In the reproductive system chapter, the book provides comprehensive coverage of male and female reproductive anatomy and physiology. The textual content is informative, with interactive 3D models and animations that depict the structures and processes involved in reproduction. Users can engage with the dynamic aspects of the reproductive system, enriching their understanding of this complex topic.

Chapter 10: Special Senses

The chapter covering special senses offers an engaging exploration of vision, hearing, taste, and smell. The textual content is well-structured, with interactive 3D models and animations that illustrate sensory organs and processes. Users can interact with dynamic visual and auditory elements, making this chapter an essential resource for understanding special senses.

Chapter 11: Clinical Applications

The clinical applications chapter bridges the gap between anatomy and clinical practice. The text effectively integrates dynamic anatomy into clinical scenarios, demonstrating the relevance of anatomical knowledge in diagnosis and treatment. This chapter serves as a valuable resource for medical students and healthcare professionals.

Chapter 12: Future of Dynamic Anatomy Education

The final chapter provides a forward-looking perspective on the future of dynamic anatomy education. It explores the potential of emerging technologies and their impact on medical education. This chapter encourages readers to embrace the evolving landscape of anatomical learning.

CONCLUSION

"Netter's Moving AnatoME, 1st Edition" represents a revolutionary approach to medical anatomy education. Chapter by chapter, the book leverages dynamic technology to create an immersive and interactive learning experience. Its combination of clear textual explanations and cutting-edge 3D animations and models offers users a unique opportunity to explore and understand human anatomy in unprecedented ways. This edition marks a significant milestone in anatomical education and sets a new standard for interactive learning resources.