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A REVIEW ARTICLE ON THE PROS AND CONS OF VIRTUAL DISSECTION VERSUS CADAVERIC DISSECTION

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ABSTRACT

Anatomy is the study of structures and their relationships as well as their orientation. It primarily concerns the structure, size, shape, and position of various bodily parts. It is critical in the scientific inquiry and study of the human body. It is separated into two sections: gross anatomy and microscopic anatomy. The study and investigation of anatomical structures that can be seen are known as gross anatomy. Later, Herophillus, an Alexandrian physician, and Erasistratus of Ceos made significant advances in cadaver dissection, and they were among the first performers of public cadaver dissection. It is the most common method of studying anatomy. The digital dissection of medical images on a touch screen anatomy visualisation table is known as virtual dissection. Because of their numerous advantages, both methods of dissection play an indisputable role in medical education. However, choosing just one of these for medical students will not provide a thorough understanding of human anatomy.

Keywords: Virtual, Dissection, 3D image, Cadaver, Ayurveda, Sharir Rachana, Anatomy

INTRODUCTION

Anatomy is a branch of medical science in which a clinician's practical abilities are developed through extensive demonstrations of the human body. A practitioner's clinical and surgical abilities cannot be developed without the accurate identification and knowledge of anatomical structures. It is essential in the practice of medicine and other health-related fields. There has been a specific reference to anatomy as well as cadaveric dissection for ages and in our traditional past. As technology advances, the process of dissection is changing as well. Virtual dissection, which provides improvised 3D imagery of the human body, is a significant technological contribution to the science of anatomy. It provides a relaxing atmosphere for medical students. Sharir Rachana is an Ayurvedic branch that enlightens the microscopic and macroscopic knowledge of the human body. Around 2000 years ago, Sushrut Acharya, renowned as the "Father of Surgery," dissected cadavers using very ancient methods. Cadaveric studies aided medical experts in understanding the human body, particularly its structural elements. With time, various advancements have been made to improve and simplify the approach of cadaveric investigation, such as virtual dissection. When there is a scarcity of cadavers, these strategies prove useful. Rather than being a new discovery, every new technology is an improved version of conventional techniques in a few characteristics. Traditional as well as modern technologies will each have their own set of benefits and drawbacks. And the major goal of this article is to explain and analyse the advantages and disadvantages of these two ways for better understanding.

Aim and Objectives:

- To examine the pros and cons of cadaver dissection and virtual dissection.
- To assess the need for cadaver and virtual dissection to be considered jointly in medical education.

Methodology: This is a literal comparative analysis based on data and references gathered from secondary sources such as the Samhita, current literature, journals, papers, and the internet.

Study Type: Comparative Literal study.

DISCUSSION

The phrase "anatomy" stem from the Greek words "ana" and "tome," which mean "cutting off the human body." As a result, cadaveric dissection is important in anatomical research. Because it depicts the human body in a way that aids in the comprehension of clinical and pathological difficulties, it acts as a portal for medical practitioners. Medical students will perform dissections of cadavers that have been donated, utilising both conventional and modern techniques. We can't draw a complete picture of anatomy without touching a human body in front of our eyes on the dissecting table. We used to employ inspection to thoroughly check the cadavers during cadaveric dissection. And, at first, it provides some insight into early and late post-mortem adjustments. When we begin dissection with our own hands and instruments, we are better able to grasp information in the most relevant way possible by using our eyes, hands, and brain. The knowledge and abilities gained via actual experience will last a lifetime. It aids us in perceiving the orientation of structures and visualising relationships between them. And it is vital to gain a better understanding of these while implementing clinical and surgical skills. In surgical practice, detailed and complete microscopic and macroscopic anatomy knowledge is critical. Cadaveric dissection instils in students the ability to respect people even after they have died by treating them as first patients. It aids in the identification of structures through tactile sensing. Because the makeup of anatomical elements in the human body, such as diverse tissues and organs, must be sensed. And, in other cases, while dissecting, we may discover structural defects in various organs. Only in the case of a dead body it can be ruled out, and we may compare the male and female cadavers, as well as other cadavers. Students who frequently practise dissection skills will acquire a perfect mental graph of human anatomy. It's also important to teach medical students about the ethical aspects of cadaver dissection. Every cadaver is a body that has been donated by the individual or their family. As a result, it is critical that it should be done in a polite

manner. Cadaveric dissection is still a popular method for studying anatomy. It might be thought of as the anatomy's heart.

Despite all of this, cadaveric dissection, like everything else in the cosmos, has its drawbacks. A cadaver should be protected and cared for with extreme caution. Due to post-mortem alterations and decomposition, it is prone to be contaminated and destroyed. And if any part of the structure is destroyed or damaged during dissection, there is no way to repair it. It is impossible to replace anything that has been destroyed. Dissection of the human body is a controversial issue in religious and civilised circles. Many people refuse to undergo cadaver dissection without first performing a religious rite. This statement is of lesser value, yet it must be respected in specific circumstances. There are other issues that develop commonly while repositioning cadavers for better understanding and visualisation of structures. Furthermore, it is vital to rule out the route of structures such as arteries one by one. As cadaveric dissection is a time-consuming technique, it will not be feasible. Cadaveric dissection is initially difficult to do since it causes students difficulty and distress owing to the application of preservatives. The order of the dissection steps is always the same. As a result, it will be difficult to dissect or foresee certain structures or organs. It's also difficult to go back and study the dissection once it's finished. Cadaveric dissection is usually time demanding, taking two to four times as long as other methods. Financially, cadaver used to be more expensive and it is now becoming a crisis for institutions. Cadavers are becoming harder to get available by these days. It is imperative to verify the safety of employing cadavers in medical education during a pandemic such as co-vid.

ADVANTAGES	**DISADVANTAGES**
Inspection, palpation, and percussion are used to access the cadaver.	The preservation and maintenance of cadavers necessitate the utmost care and attention.
Can understand and comprehend the anatomical relationships between structures.	It is not possible to reconstruct structures.
The first step toward bettering surgical abilities.	Repositioning cadaver is difficult to manage.
Tactile feeling is used to perceive information about anatomical components.	The usage of preservatives causes distress.
Cadaver as the first patient, improves the ability to respect the individual even after death.	As the dissection processes are established, it becomes difficult to visualise individual structures.
It is possible to assess early post-mortem alterations.	Time-consuming method.
Anatomical variability between individual specimens can be evaluated.	Costly method.
First encounter with death.	Decreased availability of cadaver.
In some circumstances, structural irregularities can be detected.	Some religious moral concepts can be preserved.

On the other hand, as technology progresses, there are growing number of alternative procedures for cadaveric dissection. Virtual dissection on a visual imaging table, which provides 3D views of the human body, is one of them. This is critical not only for the portrayal of the human body but also for the detailed anatomical evaluation of patients later. It is usually simple to apply because it is a digital dissection of the human body on a touch screen anatomy visualisation table. This strategy boosts the method's practicality in terms of technological advancement. It gives you a 3D platform for learning anatomy in a great way. For students, it is a convenient method of dissection. Because it is a visualisation approach, it is impossible that the human corpse will be destroyed and decomposed as in cadaveric dissection. And we may go through the structures again and again until we have a complete understand-

ing of them. Virtual dissection is useful for determining the path and route of veins, nerves, organ placement, and other things in sequential order. The use of interactive software always sharpens such images in the mind of students. Human bodies can be rotated and magnified easily, and virtual scalpels can be used to dissect them. Students can also use three-dimensional creations to isolate structures for better assessment. The capacity to rebuild and observe the dissection is a fascinating and crucial feature of virtual dissection. And if students wish to dissect any portion of the human body for research or to clear up any doubts, they can easily do so. Three-dimensional structures can also be isolated by students. Virtual technology can be used to sidestep moral concerns surrounding the destruction of human bodies, which is also unavoidable in some instances. Compared to cadaveric dissection, virtual dissection is more time-efficient and easier to do. This technology can also be used to solve the problem of diminishing cadaver availability. It is less expensive than repeatedly paying for a cadaver. Virtual dissection is a remarkable and effective tool during pandemic like co-vid.

In recent years, technological advancements have brought about numerous changes that have made our daily routine easier and more comfortable. However, it will have its drawbacks in some aspects. Students should consider a cadaver as their first patient during dissection, however, this is not realistic in virtual dissection It should initially offer them a concept of the structures and organs by employing tactile sensing. Students in virtual dissection, on the other hand, can never sense a human body and must rely solely on visualization. Only by the help of a cadaver, one can examine and interpret anatomical structures such as bones, muscles, tendons etc with more clarity. So, in addition to inspection, palpation and percussion are also required for a more accurate assessment. We can often make observations on the human body as a result of post-mortem alterations, but these observations cannot be seen on a visual imaging table. Technology advances at a rapid place, making it difficult for teachers and others to keep up. It is impossible to perform 3D dissection in a virtual imaging table without sufficient training. As a result, progress in both of these areas is important and unavoidable.

ADVANTAGES	DISADVANTAGES
Provides a three-dimensional platform in dissection.	Because it is virtual imaging, it is impossible to detect a human corpse before dissection.
Digital dissection of the human body.	Limit the tactile form of learning.
Increases the feasibility.	Cadaver should be regarded as the first patient; however, this notion does not apply in this case.
Helpful in pandemic like co-vid.	To educate and learn virtual dissection, proper training is required.
Comfortable environment for dissection.	Impossible to perceive the changes that occur after death.
Can be able to revisit the structures repeatedly.	
Can study individual systems separately.	
Can be dissected with a virtual scalpel.	
Cost-effective and Time-efficient.	
Isolation of body parts for further study is possible.	
Enhance institutional standards.	

CONCLUSION

The way the elements of a human interact to produce a functional unit is called human anatomy. In the field of anatomy, the dissection of human dead bodies plays a crucial part. More than 2000 years have passed since cadavers were first used to improve anatomical knowledge. Virtual dissection is made possible by technological advancements that create a 3D visualisation in the realm of anatomy. It's difficult to choose between cadaveric dissection and virtual dissection be-

cause each has its own set of advantages and disadvantages. Because one of its advantages becomes a drawback when used in conjunction with another.

CADAVER DISSECTION	VIRTUAL DISSECTION
Consider cadaver as the first patient to increase practical exposure.	Only visualization of the human body using virtual software.
Troublesome to students created by the use of preservatives.	Provides a comfortable 3D platform for anatomy without causing discomfort.
Anatomical knowledge gained through tactile perception.	Limits the tactile forms of learning.
Reconstruction of structures and organs are not possible.	Can reconstruct, revisit, and analyse repeatedly.
Can appreciate the anatomical relationship between layers, structures, regions, and so on in a dissection of the human body.	Only virtual dissection by using virtual scalpels and other instruments.
Difficulties in the repositioning of a cadaver.	Can easily change the posture, rotate and magnify images.
Time-consuming.	Time-efficient.
Anatomical variabilities between individual specimens can be studied.	Individual specimens will not be available for further research.
Costly	Cost-effective.
Can't isolate specific body parts.	Isolation of body parts or individual systems is possible.

So, based on the table above, we can see how both strategies work. Cadaveric dissection is a time-tested and traditional way of studying anatomy. However, there are some negative aspects to it. Virtual dissection, on the other hand, is an example of advanced technology. In every aspect of life, technology plays a significant role. It always inspires and strengthens scientific inquiry, resulting in scientific growth. However, as in virtual dissection, it will always have its drawbacks. As a result of all of these characteristics, it will be necessary to incorporate both of these strategies in an institute rather than avoiding one of them. It will be beneficial for medical students to have a broad understanding of human anatomy. This will also serve as an improvised dissecting platform. The combination of cadaver dissection and virtual dissection, will be excellent, resulting in substantial advancements in medical education.

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