

Ethics in Anatomy Dissection: from Cadavers to Cybernetics

Akatya Vidushi Sinha¹, Rupali Sachdev²

¹Final Year MBBS Student, MGM Medical College & Hospital, Kamothe, Navi Mumbai.

²Grant Medical College & Sir Jamsheedjee Jeejeebhoy Group of Hospitals, Mumbai.

Corresponding Author: Akatya Vidushi Sinha

E-mail: akatyasinha@gmail.com

Ethical constraints concerning cadavers do not usually cross the minds of a medical professional as it would sound or seem strange to pay attention to the importance of a dead body or any ethical issues surrounding the cadaver. However, the most important book in the history of medicine is an anatomical treatise published in 1543, 'De humani corporis fabrica', based on dissections of the human body. In the seven volumes by Andreas Vesalius, the illustrations are exquisite for their beauty, complexity, and humanity [1]. Cadaveric dissection has been the paradigm of anatomical teaching since the Renaissance, defining the experience of medical teaching since the 16th and 17th centuries [2]. In addition, the practice of cadaveric dissection helps students to not only grasp the three-dimensional anatomy but also conceptualize innumerable variations [3]. The experience of dissection provides an opportunity for nurturing and imbibing the ethical principles of practice among medical students starting early in their curriculum. The most important principle being Autonomy. According to this, an individual must have autonomous control over the disposition of their body following death.

Anatomy is the essence of medical education considered to be the building block of developing clinical skills. Clinicians shifted their focus from trying to find the underlying cause of the condition to try to locate the anatomical site of the disease [4]. Every clinical science requires the knowledge of anatomy in varying levels of depth. A clinical pathologist, radiologist, and surgeon needs to know the human body inside out. Dissection trains the fingers of the future surgeon. Any novel surgical technique has to be mastered on the cadavers before being implemented on patients. The research in the field of anatomy and pathology including its surgical anatomy, microscopic or molecular research is based on cadavers. The medical device and technology community, which is currently booming in India also heavily depends on cadavers for developing new products and maneuvers. They use the cadavers to make measurements of anatomical structures for the development of new medical devices and to train clinicians for the execution of these innovative procedures [5].

This makes anatomy invaluable to the modern clinician. Researchers have even suggested that the time has come to reinstate dissection as the core method of teaching gross anatomy to ensure safe medical practice. Nevertheless, as dissection alone cannot provide a uniform learning experience hence needs to be complemented with other innovative learning methods in the future education model of anatomy [6].

It is a subject that requires both theoretical pieces of knowledge delivered in the form of lectures as well as clinical applications learned during cadaveric dissection. Theory lectures may be delivered effectively by online classes, but this makes the learning incomplete. Cadaveric dissection is considered the "gold standard" in anatomy education. Despite emerging technology and evolved teaching methods pertaining to anatomy, dissection continues to remain a cornerstone of learning.

Internationally, most medical schools provide some form of an orientation program to the newly joined medical students before they begin cadaveric dissection. In Southeast Asia, the Korea University College of Medicine organizes an extensive 12-week cadaver dissection course for first-year students. They arrange two annual ceremonies at the beginning as well as in the middle of the course. During the ceremony on the first day, anatomy professors provide lectures regarding professional attitudes when dealing with human cadavers. Besides this, every dissection table has a signboard that provides a brief personal history and photographs of the donor and his/her will for the students. Memorial ceremonies, including not only large-scale events but also daily rituals, had educational effects that prevented the decline of students' responsibility and respect during the dissection course [7].

In India, Byramjee Jeejeebhoy Government Medical College in Pune organizes an orientation program for the first-year students where they explain the sourcing of the cadavers, how they are preserved and emphasis is kept on being respectful to the bodies throughout their term of dissection. But such programs are far and few in between. Unfortunately, most universities do not stress upon educating students regarding the ethical and psychological considerations which are necessary before diving headfirst into the cadaveric dissection.

The earliest descriptions of the emotional response to dissection led us to think that the reaction was suppressed or controlled without creating any problems of distress by repressing their emotions and developing a "scientific" attitude. Reactions have been shown to be physical (nausea, fainting, loss of appetite, sleeplessness or nightmares) in 23% of students and psychological (horror, 11%; anxiety, 75%) in others, although these reactions have been shown to reduce after the first few weeks of dissection [8]. In some studies, the experience of dissection produced noticeable upsets in 5% of students, such as nightmares, intrusive visual images, insomnia, depression, and learning difficulties [9]. Shalev and Nathan [10] argued that anxiety experienced during dissection crystallized in the doctor-patient relationship.

When students join the medical school, it's a different universe as compared to their previous universities. Having moved away from home, anxiety is high and pressure to perform is even more. Adding to that is interacting with cadavers with little to no orientation being provided to them. In previous studies, participants have described their apprehension and anxiety during their first encounter with cadavers that diminished over the course of their academic year. Unfortunately, their positive emotions such as gratitude and responsibility also tended to decline under the pressure of excessive workloads and frequent examinations [7].

With the advent of smartphones, images, textbooks, research papers, and videos became available to students in the palm of their hands. The use of images in various forms (drawing, photography, digital applications) has always been intrinsically associated with anatomy; however, the way in which anatomy educators and students create, access, view, and interact with images has changed dramatically over the last 20 years. This has made learning anatomy much simpler than the days of physical models and charts. As technology elevates by leaps and bounds, we will soon have access to 3D models and entire virtual cadavers.

Social media on the other hand has connected educators and students across the world. A student sitting in India can watch a live surgery happening on the other side of the world. Anatomy educators and professors have realized that they need to modify their method of engagement with students, especially after the pandemic. Short-form videos covering individual topics can be found on various social media platforms. But with the ease of sharing videos and images from dissection halls, new ethical dilemmas have arrived which require research and emphasize the need for guidelines to be set up for those in the dissection halls to ensure that they are respecting the potentially conflicting needs and preferences of donors, donor families, students, the public, regulators and anatomy educators themselves [8].

It has already been famously quoted even before the pandemic hit that "Anatomy education has been resistant to change for almost a millennium" and what is happening now is just a sign of a possible historic transition and that we are at the beginning of a paradigm shift. Cadaveless dissection was historically predicted and that traditional anatomy will be encroached by alternative

modes like virtual dissection, medical imaging, living anatomy, and various multimedia resources [9]. However traditional cadaveric dissection cannot be overruled but can rather be complemented with high evolving tech - innovations for a better understanding of anatomy education. A few literature reviews suggested that Winkelmann reviewed 14 studies comparing different anatomy teaching strategies including dissection, prosection, and online computer-based programs, and found no evidence that any method was superior [10], whereas Lombardi, Hicks, Thompson, and Marbach-Ad compared three different teaching modalities such as models, cadaver dissection, and virtual dissection [11]. Virtual dissections have the potential to enhance traditional cadaveric pedagogy to allow further inspection of anatomic structures and application of anatomy to clinical context for health science clinical students whereas, visualization remains a key strategy for learning human anatomy, allowing students to link structures together in a three-dimensional manner while respecting scale and function, for a deeper understanding. In any case, it is important to look at how in the best way cadaver dissection would blend with the current technology-based teaching and the learning modalities that have been adopted during the course of the pandemic.

From time immemorial, cadaveric dissection has been commonly employed as a primary method of practical teaching and the basics of anatomical education worldwide. Conventionally, cadaveric dissection has been embraced and widely accepted as the best fit for comprehensive and gross teaching in anatomy education, thus placing an undue rise in cadavers' demands. However, the emergence of COVID-19 has posed significant effects on medical education with substantial impacts on anatomy education and practice, as seen in the shift from classroom to virtual learning. An essential area of anatomy education and training that requires immediate consideration is the position of cadaveric dissection in a post-COVID-19 era, which entails not only the safety of cadavers from possible SARS-CoV-2 infection before their use but also their maintenance. However, some practical issues pertaining to anatomy education need to be considered as a result of the COVID-19 pandemic. Currently, surgical residents and medical students who are not able to access cadavers due to safety measures like social distancing, may not have this provision due to the paucity of cadavers. As there has already been a scarcity of cadavers in most teaching hospitals all over the world, most of the institutes are now reliant on the body donation program. Moreover, various medical colleges have even denied accepting bodies during the course of this pandemic as the donor may be a carrier or infected with COVID-19. Unfortunately, it is not feasible to test the cadaver as screening kits for the suspected cases in the present scenario. Also, a high number of negative results of laboratory screening should not rule out COVID-19 infection [12].

There are some practical issues in anatomy education to consider as a result of the pandemic Covid-19. Currently, students and residents of surgery are not able to access cadavers due to social distancing reasons, however, future students and residents may not have this provision due to the paucity of cadavers. There is already a scarcity of cadavers in most medical colleges globally and most of the institutes are reliant on the body donation program. Many medical institutes have denied accepting bodies during this pandemic. The donor may be a carrier or infected with Covid-19 and it is not feasible to test the cadaver as screening kits are not enough to even for all live suspected cases in the present scenario. Moreover, negative results of laboratory screening may not rule out Covid-19 infection. The optimal approach to donor screening may change over time as more data will be collected [12]

Medical education needs to metamorphose with the changing times and we need to understand that an ethical approach is the essence of medicine. Everything that a student learns in medical school shapes their perspective and approach as physicians later in life.

“Medical education is not just a program for building knowledge and skills in its recipients... it is also an experience which creates attitudes and expectations.” - Abraham Flexner

We must realize the privilege of being able to learn anatomy through a holistic approach including cadaveric dissection, illustrations, 3D models, videos, applications, and software supplemented by lectures and tutorials while keeping in mind, the drawbacks of each of these methods. Cadaveric

dissection must be preceded by sensitization and orientation sessions for the students so as to develop empathy and respect in them. As we move towards other alternatives to cadaveric dissection, we must not forget our roots and always keep in mind where every great clinician started from. We must help create an attitude of learning well beyond the confines of examinations and help students to understand the ethical dilemmas which they will face, not just in anatomy but also in their life as doctors.

REFERENCES

1. Rath G, Garg K. Inception of cadaver dissection and its relevance in present day scenario of medical education. *J Indian Med Assoc* 2006;104(6):331–3.
2. Winkelmann A. Anatomical dissection as a teaching method in medical school: a review of the evidence. *Med Educ* 2007;41(1):15–22.
3. Marom A. The birth, death, and renaissance (?) of dissection: A critique of anatomy teaching with- or without-the human body. *Acad Med* 2020;95(7):999–1005.
4. Singal A, Bansal A, Chaudhary P. Cadavresans anatomie: l'obscurité au temps de la pandémie Covid-19. *Morphologie* 2020;104(346):147–50.
5. Ghosh SK. Cadaveric dissection as an educational tool for anatomical sciences in the 21st century. *Anat Sci Educ* 2017;10(3):286–99.
6. Chang H-J, Kim HJ, Rhyu IJ, Lee Y-M, Uhm C-S. Emotional experiences of medical students during cadaver dissection and the role of memorial ceremonies: a qualitative study. *BMC Med Educ* 2018;18(1):255.
7. Marks Jr SC, Bertman SL, Penney JC. Human anatomy: A foundation for education about death and dying in medicine. *Clin Anat* 1997;10(2):118–22.
8. Hennessy CM, Smith CF. Digital and social media in anatomy education. *Adv Exp Med Biol* 2020;1260:109–22.
9. Darras KE, Spouge R, Hatala R, Nicolaou S, Hu J, Worthington A, et al. Integrated virtual and cadaveric dissection laboratories enhance first year medical students' anatomy experience: a pilot study. *BMC Med Educ* 2019;19(1):366.
10. Winkelmann A, Güldner FH. Cadavers as teachers: the dissecting room experience in Thailand. *BMJ* 2004;329(7480):1455–7.
11. Lombardi SA, Hicks RE, Thompson KV, Marbach-Ad G. Are all hands-on activities equally effective? Effect of using plastic models, organ dissections, and virtual dissections on student learning and perceptions. *Adv Physiol Educ* 2014;38(1):80–6.
12. Onigbinde OA, Chia T, Oyeniran OI, Ajagbe AO. The place of cadaveric dissection in post-COVID-19 anatomy education. *Morphologie* 2021;105(351):259–66.

Acknowledgements: Nil

Conflict of interest: Nil

Funding: Nil