

## Anatomical Teaching Principles: Ghosts from the Past, Present, and Future

Dr. Mahindra Kumar Anand<sup>1</sup>, Dr. Swati Yadav<sup>2\*</sup>, Aarushi Batra<sup>3</sup>

1. Professor, Department of Anatomy, Santosh Medical College & Hospital, Santosh Deemed to be University, Ghaziabad
2. Assistant Professor, Department of Anatomy, Santosh Medical College & Hospital, Santosh Deemed to be University, Ghaziabad
3. MBBS final year, LLRM Medical College Merrut, UP

**\*Dr. Swati Yadav- Corresponding Author**

### ABSTRACT

The history of teaching anatomy in formal medical education may be the longest of all the subjects. We briefly discuss the history of dissection in this article, but we also go over the neglected subject of the utilization of living anatomy throughout time.

We explore the contemporary arguments for and against using cadavers, prosection versus dissection, and the use of living anatomy and radiography in place of cadavers. Future possibilities are taken into account, along with a few things that might prevent change.

### INTRODUCTION

Anatomy is regarded as one of the most important aspects of medical school, and studying anatomy with a dissected corpse is seen as the course's distinctively distinguishing element. However, it's possible that a paradigm shift is about to occur, supported by fresh knowledge and cutting-edge technology. At such times, opinions are held dearly and proclaimed with passion.

The use of the living body in anatomy instruction has received less attention than the history of dissection. In this paper, we provide a brief overview of cadaver use and offer a pioneering contribution to the development of living anatomy. Then we go over the arguments for and

against using cadavers in place of studying the living body and using medical imaging, as well as the value of dissection and prosection.

## **THE HISTORY OF DISSECTION**

Since the Renaissance, cadaveric dissection has served as the model for teaching anatomy, and since the 16th and 17th centuries, it has served as the centerpiece of medical education. [1,2] Cadaveric dissection then frequently appeared in medical training, albeit frequently in an unofficial, semi-official setting.

Anatomy schools located in hospitals, which could use the bodies of their own deceased patients as a result of stricter regulations on how bodies may be procured, benefited (often as a quid pro quo for free treatment while alive). This was a turning point because it signaled the end of the "apprenticeship model" of medical training, which frequently consisted of one-on-one instruction, and the beginning of a professional training model where students were taught in larger groups by people for whom teaching was one of their primary jobs.

It is helpful to distinguish between passive dissection by students and active dissection, which was a staple of Renaissance instruction through the "anatomy theatre." Eventually, dissection replaced observation as the preferred method of learning and became regarded as inferior to it.

When conventional medicine (literally) moved from being informal and unprofessionalized to being formalized and professionalized, a more profound psychological shift may have also occurred at this time. In other words, the practice of medicine changed from the unique, patient-focused world of the past to the standardized, disease-focused world of the Rationalist future. The growing perception of the establishment of a professional monopoly may have served to further promote the trend toward dissection. Everyone, including men and women, professionals in medicine and laypeople, may watch dissections in the anatomy theater.

Dissection has thus been ingrained into medical education to the point where it is now practically expected of all medical schools. More recently, Dyer and Thorndike [3] argued that because anatomy is no longer viewed as a research-driven field, its standing as a science has declined. The nature of science is a topic of intense discussion. The development of a scientific hypothesis, which may be confirmed or refuted, and which is qualified by statements of conditional

probability, is the focal point of a more traditional definition of science. Science, medicine, and technology should be defined as an integrated enterprise of knowing and acting defined through four "ways of knowing": extracting meaning, gathering and classifying data, analyzing, and experimenting. This is how John Pickstone [4] presented a somewhat different philosophy on the nature of science. Today, it is unlikely to find novel gross structures, with the possible exception of the study of neuroanatomy, and this has affected the status of anatomy as a science. The anatomical body as it is depicted in textbooks is portrayed as an objective reality, consisting of a set of universal observations in a form that is both easy to comprehend and difficult to fully comprehend. Everyone may study and appreciate this reality as a part of a shared experience.

### **THE HISTORY OF LIVING ANATOMY**

As far as we are aware, the history of teaching anatomy through the study of the living body has received less attention than the history of anatomy instruction using the corpse, which is thoroughly recorded and documented. Of fact, the live body has always been of great fascination to artists, and art history may offer a gateway to this topic.

There is, however, a dearth of academic literature describing the applications of live anatomy. 'It has been several years since the study of the living model was introduced into anatomy schools as a means of augmenting the training in anatomy received by the dissection of the cadaver,' said anatomist David Waterston in his 1931 publication *Anatomy in the Living Model* [5]. This implies that it had not occurred prior to that, at least not in UK medical colleges. In addition, Waterston cited the General Medical Council's (GMC) recent recommendation that medical students' professional training include "the demonstration of structure and function in the living." [5] Due to the gaps in its archives, the GMC itself does not appear to have a record of this advice. When recommending the use of living models in anatomy instruction in 1968, Barrows and colleagues [6] noted that "through the anatomy course, the students gradually develop an objective but respectful attitude towards the cadaver." Contrarily, it appears that medical students do not enter the clinical setting with the same neutrality towards the naked human body. In contrast, Metcalf and colleagues [7] established a living anatomy course in 1982 where mandatory peer-examination, including breast and internal examinations, was practiced in mixed

sex pairings. They made the argument that peer-examination was more helpful than the use of life models. Studies are referred to by these writers and others<sup>10</sup> as both a way to learn about anatomy in general and as an introduction to the physical examination. The American Association of Clinical Anatomists [9] and the Anatomical Society of Great Britain and Ireland [8] both frequently emphasize the importance of identifying structures in the living throughout their "benchmark" core curricula. However, living anatomy is usually left out of studies on anatomy education methods. [10,11]

## **THE DEBATES**

There are several ongoing discussions in medical education about the best ways to teach anatomy. Two of these discussions are summarized below.

### *Advantages and disadvantages of dissection*

#### *Advantages*

The use of dissection is strongly advised in the vast majority of published publications on anatomy education. Dissection proponents typically list a variety of advantages that might result from dissection. [3,12–16] The three key areas in which these advantages can be found are information acquisition and integration, skills, and attitudes.

The development of cognitive anatomical knowledge and its specific vocabulary, appreciation of three-dimensional relationships and anatomical variability, establishment of a system for classifying tissues, laying the groundwork for the study of other fields where knowledge of structure is crucial (such as physiology, microbiology, and pharmacology), participation in cadaver-patient-centered computer-assisted learning, and more are some of the benefits identified in the first domain.

More recently, medical students have identified a respect for the physical body and an understanding of the historical significance of dissection as additional benefits of learning anatomy through dissection. [17]

#### *Disadvantages*

According to some, there are a number of significant drawbacks to utilizing cadavers to study anatomy that can be divided into three categories: the emotional effects of dissection; health and

safety concerns for those handling cadaveric material; and, finally, the practical considerations and cost of employing cadavers.

The use of cadavers has important consequences for health and safety, including exposure to chemicals used in embalming fluids, improperly preserved human tissue, and infectious diseases such transmissible spongiform encephalopathies, the human immunodeficiency virus, tuberculosis, and hepatitis. [18] There are also legal requirements, such as those related to the Human Tissues Act and the Anatomy Act in the UK.

Obtaining cadavers, the expense of transporting, storing, and disposing of cadavers, the lack of qualified anatomists, and the length of time needed for dissection-based research are other practical issues related to dissection. The amount of cadaveric material available for anatomical research has decreased as a result of these reasons, increased student enrollment, and the opening of new medical schools. High student-to-cadaver ratios caused by young cadavers must necessarily diminish the value of dissection as a worthwhile educational activity.

### ***Discussion***

Understanding the living body has historically been the main goal of dissection and the use of the cadaver. However, in practical practice, doctors are almost always compelled to deal with the living body, and the study of the corpse is primarily limited to different types of pathologists. Even less frequently is the chemically preserved cadaver studied in clinical settings. Therefore, it is reasonable to wonder if there are alternative ways that this main goal can be accomplished in undergraduate medical courses.

The debate has occasionally not been appropriately represented. For instance, it has been said that "all anatomical education is carried out using plastic models" rather than discussing the merits of living anatomy and imaging vs dissection. [19] Motives might be misconstrued as well. While the original article to which the writer was referring explicitly stated that the authors were "primarily concerned that our program produces clinicians who are capable of using their understanding of anatomy in the management of clinical problems," and "It is not intended to imply that alternatives to cadavers are not available," one critic wrote: "Reading between the lines, the decision to do this seems to have been made for reasons of expense and resources"

[20]. [21] In fact, the cadaveric alternative to instruction is more expensive than instruction that heavily utilizes medical imaging and consultant radiologist teaching. A third strategy is to just dismiss the non-cadaveric method as unworthy of discussion, such as by saying things like "the educational arguments simply do not exist." [20]

The responses could also be caused by a more widespread anxiety. With dwindling resources and a shortage of trained teachers, anatomists today fear that their field is in danger. A shift away from cadaveric dissection could be seen as a diminution of the significance of anatomy as a subject in medical education. Nothing could be further from the truth; students' understanding of human structure continues to be very important. Instead, the question is what kind of anatomy it ought to have. Dissection's strongest defense must be based on anatomical knowledge. The aim of medical school, however, is not to produce excellent doctors; rather, it is to impart anatomical information.

### **THE FUTURE**

The area of evaluation in anatomy education is likely where there is room for the most development. Which approach to educating about body structure results in the best clinicians is the issue we need to address. Sadly, there is very little evidence of this kind, in part because doing such research is difficult and partly because there hasn't been a wide enough variety of ways used in the past to allow for comparisons. The "show and tell" style of evaluation studies, or "this is what we do in our institution," has been common up to this point.

However, the relative benefits of various ways won't be apparent for some time. This won't occur for at least ten years after a certain strategy is started. We might discover that the first year or even the first two years of a new approach are not representative, and perhaps the research term should be extended in accordance, as any new teaching method requires time to be developed. Determining the clinical outcomes of a teaching intervention and measuring these in clinical practice are constantly challenging tasks in medical education. Dropout rates, the length of time it takes to join a professional organization, the length of time it takes to advance, opinions of peers and patients, and the quantity of complaints are examples of substitute metrics that have been utilized.

Working with a living body has a significant emotional impact, just as working with cadavers is a meaningful experience. It might even develop into a similar rite of passage to dissection. It's normal to see brand-new pupils put their hands on a living human body for the first time and immediately go silent, deaf, and blind. This is due to the possibility that they have never intentionally touched an adult human being with whom they are not related, outside of a sexual setting. It is encouraging to see how they mature into professionals over the course of a school year.

## REFERENCES

1. Richardson R. *Death, Dissection and the Destitute*. London: Penguin 1988.
2. Persaud TVN. *The Early History of Human Anatomy: from Antiquity to the Beginning of the Modern Era*. Springfield, Illinois: Thomas Books 1984.
3. Dyer GS, Thorndike ME. Quidne mortui vivos docent? The evolving purpose of human dissection in medical education. *Acad Med* 2000;75:969–79.
4. Pickstone JV. *Ways of Knowing: a New History of Science, Technology and Medicine*. Chicago: University of Chicago Press 2001;5–28.
5. Waterston D. *Anatomy in the Living Model*. London: Hodder and Stoughton 1931.
6. Barrows HS, Patek PR, Abrahamson S. Introduction of the living human body in freshman gross anatomy. *Br J Med Educ* 1968;2:33–5.
7. Metcalf NF, Prentice ED, Metcalf WK, Stinson WW. Peer group models in examination instruction as an integral part of medical gross-anatomy. *J Med Educ* 1982;57:641–4.
8. Anatomical Society of Great Britain and Ireland. Setting a benchmark for anatomical knowledge and its assessment: a core curriculum for the teaching of anatomy to medical students. <http://www.anat-soc.org.uk/linkfiles/anat-core-curric.htm>. [Accessed 5 February 2006.]
9. Educational Affairs Committee, American Association of Anatomists. A clinical anatomy curriculum for the medical student of the 21st century: gross anatomy. *Clin Anat* 1996;9:71–99.
10. Heylings D. Anatomy 1999–2000: the curriculum, who teaches it and how? *Med Educ* 2002;36:702–10.
11. Drake RL, Lowrie DJ Jr, Prewitt CM. *Survey of gross anatomy, microscopic anatomy,*

neuroscience, and embryology courses in medical school curricula in the United States. *Anat Rec* 2002;269:118–22.

12. Aziz MA, McKenzie JC, Wilson JS, Cowie RJ, Ayeni SA, Dunn BK. The human cadaver in the age of biomedical informatics. *Anat Rec* 2002;269:20–32.

13. von Ludinghausen M. The goal of dissection in clinically oriented teaching. *Clin Anat* 1992;5:488–9.

14. Newell RLM. Follow the royal road: the case for dissection. *Clin Anat* 1995;8:124–7.

15. Coulehan JL, Williams PC, Landis D, Naser C. The first patient. reflections and stories about the anatomy cadaver. *Teach Learn Med* 1995;7:61–6.

16. Aziz MA, McKenzie JC. The dead can still teach the living. The status of cadaver-based anatomy in the age of electronic media. *Perspec Biol Med* 1999;42:402–21.

17. Lempp HK. Perceptions of dissection by students in one medical school: beyond learning about anatomy. A qualitative study. *Med Educ* 2005;39(3):318–25.

18. Demiryürek D, Bayramoglu A, Ustacelebi S. Infective agents in fixed human cadavers: a brief review and suggested guidelines. *Anat Rec* 2002;269:194–7.

19. Channel 4. Anatomy for Beginners. <http://www.channel4.com/science/microsites/A/anatomy> [Accessed 26 January 2005.]

20. Stansby G. Teaching anatomy without cadavers. [Letter.] *Med Educ* 2004;38:911.

21. McLachlan JC, Bligh J, Bradley P, Searle J. Teaching anatomy without cadavers. *Med Educ* 2004;38:418–24.

22. Older J. Anatomy: a must for teaching the next generation. *J R Coll Surg Edinb* 2004;2:79–90.