

# THE ROLE OF CADAVERIC DISSECTIONS IN CURRENT MEDICAL EDUCATION: A CRITICAL REVIEW

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## ABSTRACT

Human cadaveric dissection has been utilised in medical education for centuries. Historical reports suggest that the ancient Greek physicians introduced human cadaveric dissection in medical schools in the 3rd century BC. With the advent of modern technology, the relevance of human cadaveric dissection has been critically evaluated in relation to modern medical curriculum. Some medical schools and universities have replaced cadaveric dissection with virtual or digital dissection. From the available evidence, it appears that virtual cadaveric dissection can be a useful adjunct in overcoming the limitations of traditional cadaveric dissection. This is evident in its ability to simulate real life situation during dissection of structures such as the neural and blood vessels.

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## INTRODUCTION

Cadaveric dissection is the process of cutting apart a dead human body by physicians and scientists to study the anatomy, locate disease sites, and determine causes of death.<sup>1</sup> Human cadaveric dissection has been utilised in medical education for centuries. Historical reports suggest that the ancient Greek physicians introduced human cadaveric dissection in medical schools in the 3rd century BC. This was largely encouraged by permission granted to the ancient physicians by the Greek royalty. Consequently, Greek physicians such as Herophilus and Erasistratus in Alexandria dissected the bodies of executed criminals bodies for anatomical studies.<sup>2,3</sup>

However, the acceptance of cadaveric dissection in other parts of the world suffered significant delay due to the Papal Bull issued in 1299, which forbade tampering with corpses and removal of flesh from dead bodies. This bull was originally

intended to discourage the mutilation of soldiers corpses during the holy wars, but it largely discouraged the practice of human cadaveric dissection. In spite of this, cadaveric dissection continued to thrive particularly in few institution such as the University of Bologna.<sup>1,4</sup> This was mainly due to an earlier Papal Bull in 1292, which allowed this University to teach Anatomy to students from various countries of the world. Many of the students of the University of Bologna later became scholars and physicians in their home countries, hence the propagation of human cadaveric dissection in other parts of the world.<sup>1</sup>

Cadaveric dissection in other parts of Europe particularly France developed in the 14th century. The dissections were initially conducted on bodies of criminals, but with increasing thirst for in-depth knowledge of Anatomy by the French universities, post mortem autopsies became prevalent. The autopsies served the dual purpose of unraveling causes of diseases and detailed understanding of human anatomy.<sup>4</sup> Vesalius is largely credited for instigating the fundamental change in approach to human cadaveric dissection with his assertion "that to understand human anatomy, it is essential to dissect the

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human body".<sup>5</sup> Before the arrival of Vesalius at the University of Paris, his scientific colleagues utilised illustrations recorded from dissecting animals remains such as dogs as the main tool in teaching anatomy. Dissections were traditionally performed by barbers while the lecturers stand far apart on lecterns to read from the texts. Hence there are numerous misconceptions about the human anatomy prior to this time. The knowledge of human anatomy as it is today significantly improved when scholars like Vesalius began to partake in cadaveric dissection.<sup>6</sup>

In the Great Britain, the anatomy act of 1832 inspired the practice of human cadaveric dissection across the British universities. The Warburton Anatomy act, permitted the removal of unclaimed corpses from workhouses and charitable hospitals for dissection by state licensed anatomists. This was intended to discourage the practice of grave robbing prevalent throughout 18th century in Europe.<sup>1</sup> In the United States, laws were promulgated between 1930 and 1933 to legalise dissection of unclaimed corpses in licensed institution.<sup>7</sup> Nevertheless, the practice of human cadaveric dissection experienced a downturn in Germany and parts of Europe controlled by socialist government from 1933-1945. During this period, the governing regime in Germany provided corpses of political prisoners to various anatomical institutes for dissection, without ethical consideration.<sup>8</sup>

In the last few decades ethical practice of human cadaveric dissection has been improved by the Uniform Anatomical Gift Act (UAGA). The UAGA act promulgated in 1968, defined the human body as a property and provided appropriate guidelines on donation of such for transplant and anatomical dissection.<sup>9</sup> Moreover, the human tissue act of 2004 and the European Federation for Experimental Morphology Guidelines of 2005 have provided further recommendations towards ethical handling of human cadavers for anatomical studies. These legislations and guidelines have improved body donation processes across different countries of the world.<sup>10,11</sup>

## CHALLENGES AND ADVANTAGES OF CADAVERIC DISSECTION

With the advent of modern technology, the relevance of human cadaveric dissection has been

critically evaluated in relation to modern medical curriculum. Some medical schools and universities have replaced cadaveric dissection with virtual or digital dissection.<sup>12,13</sup> Many universities have downplayed human dissection, and supplemented this with radiological imaging in the teaching of anatomy.<sup>1</sup>

The problems associated with traditional cadaveric dissection include the fact that it can be an unpleasant and physically strenuous exercise. Hence, many students often find the sight of cadavers repugnant at first contact. Perhaps the biggest criticism of traditional cadaveric dissection is the fact that it represents post mortem Anatomy because it does not reveal functional images of some structures such as arteries and veins.<sup>14</sup>

The supply and storage of the cadavers has also been historically challenging in many countries. However, with the rise of body donation programmes this challenge is gradually being resolved. Moreover, many societies still have religious aversion to dissection of the human body. All these factors hinder the use of cadaveric dissection in the teaching of anatomy in medical schools.<sup>1</sup>

Virtual cadaveric dissection or digital cadaveric dissection is gradually emerging as an alternative in teaching Anatomy. This incorporates patients Computerised Tomographic images into softwares allowing for interactive dissection by students. In spite of the costs of the acquisition of the technology, proponents of virtual dissection have opined that it allows real life interaction during tissue dissection, which is an important advantage over the post mortem anatomy provided by traditional cadaveric dissection.<sup>14</sup>

There are few studies comparing the effectiveness of virtual cadaveric dissection with traditional cadaveric dissection. In a recent randomised controlled trial Wiet et al, compared a newly developed virtual temporal bone dissection system with traditional temporal bone dissection in the training of surgeons from eight different institutions across the United States. This study involved eighty surgeons randomised into either virtual or traditional cadaveric dissection training groups. After a two weeks training

period using the two methods, there was no significant difference in the knowledge acquisition and performance of the trainees from the two groups when evaluated with a blinded rating instrument.<sup>15</sup>

Nevertheless, recent studies have continued to justify cadaveric dissection in medical education. The reasons advanced for this include the improved visualisation of body structures among students when dissections are undertaken during Anatomy classes. Also, the encounter with the human cadavers early in the medical career has been reported to improve empathy among medical students in their career.<sup>16</sup>

In a recent study of the impact of cadaveric dissection on the new integrated medical curriculum, the authors reported that despite advancement in the development of educational materials, dissection remains an integral part of learning anatomy. A survey among surgeons about future teaching methods in Anatomy, revealed that majority of the respondents (65%) prefer cadaveric dissection. Although 75% of the respondents also supported the integration of computerised tomography into the teaching of anatomy in medical schools.<sup>16</sup> A recent review further asserted that cadaveric dissection moulds the medical student into a practitioner with independent skills and recommended the incorporation of modern innovative learning such as virtual dissection, as adjunct to traditional cadaveric dissection.<sup>1</sup>

Furthermore, in a recent report Ghanzafar et al studied the perception of cadaveric dissection amongst practising physicians, the survey included 842 medical doctors. Majority of the doctors recommended the combination of cadaveric dissection with newer resources such as digital imaging as the most functional approach to teaching Anatomy.<sup>17</sup>

The challenges of supply of cadavers has been obviated by the rise in ethical body donation programmes worldwide. Abbasi et al recently reported on the medical students' perception of body donation programme. In this survey, 331 students offering anatomy in a university were interviewed on cultural acceptance of body donation. Seventy-seven percent of the

respondents were receptive to body donation programmes. In this study, the respondents supported ethical body donation advocacy through media campaigns.<sup>18</sup>

## CONCLUSION

From the available evidence, it appears that virtual cadaveric dissection can be a useful adjunct in overcoming the limitations of traditional cadaveric dissection. This is evident in its ability to simulate real life situation during dissection of structures such as the neural and blood vessels. Virtual cadaveric dissection allows for better visualisation of the vascular Anatomy since blood flow in the circulatory systems is demonstrated during the interaction.<sup>13</sup>

However, the real life interaction with the human body provided by traditional cadaveric dissection and the empathy such encounter creates in a student may be invaluable in teaching appropriate skills to future physicians.

Perhaps what the modern medical education requires is the combination of virtual cadaveric dissection with the traditional method of dissection to maximise the advantages of each approach.

There is a need for high quality randomised controlled trials on the best method of teaching Anatomy. Such studies should compare the performance of students when participating in virtual cadaveric dissection only, traditional cadaveric dissection only with performance when the two methods are combined.

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