

Research Article – Education in anatomy and embryology

Perceptions of human cadaver dissection by medical students: a highly valued experience

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Abstract

Cadaver dissection remains a cornerstone in the study of anatomical sciences by medical students. However, this activity can cause emotions that may affect learning outcomes. This study, which involved medical students of various cultural backgrounds, assessed their responses to dissection. Medicine I year students (n = 100) at Oakland University William Beaumont School of Medicine were invited to complete a questionnaire after the first week of dissection, and again at the end of the course. The questionnaire asked for demographics, and assessed the students' appraisal of their dissection experience, cultural influences, coping activities and learning outcomes.

After the first week of dissection, most of the students found the experience challenging, stimulating, exciting and informative, rather than nauseating or unbearable. Still, some students found the experience anxiety-provoking, especially when they thought about human mortality.

Cultural background influenced the students' emotional development as they worked through the course. Most of the participants agreed that dissection promotes teamwork, familiarity with the human body, and integration of the theoretical knowledge with practical application.

At the end of the course, dissection was significantly less anxiety-provoking, and, interestingly, the study found that culture and religious beliefs became more important to the students. Most students agreed that dissection is important, relevant, and necessary, and has the potential to improve learning outcomes that are essential to the development of physicians. The study suggests that an introductory course in social, behavioral and ethical considerations be presented at the beginning of the medical curriculum.

Key words

Anatomy, Dissection, Cadavers, Medical education, Perception, Learning outcomes

Introduction

Teaching anatomy, the oldest of medical sciences, has undergone changes over the centuries. However, cadaver dissection has remained the cornerstone of the medical education process. All professional anatomical associations and societies clearly state that dissecting cadavers provides an essential building block of knowledge for medical students. The exposure to cadavers contributes significantly to the ritual transfor-

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mation of students from lay people to medical practitioners. This is despite the many modern alternatives, such as artificial plastic models, 3D digitalized organs, and plastinated specimens (Moxham and Moxham, 2007; Nas et al., 2011; Ashdown et al., 2013).

Indeed, the initial cadaver dissection is a positive experience and a significant life-changing event for many medical students. However, there is a small number of students who see dissection as a traumatic experience. In the USA and the UK, 25-48% of students reported some degree of anxiety, which makes cadaver dissection emotionally challenging (Hancock et al., 2004; Houwink et al., 2004; Dempster et al., 2006). Across the years, most students engage in the dissection enthusiastically, but some students find dissection an intolerable experience and they distance themselves. This behavior calls for faculty to identify, acknowledge and validate students' emotional distress, because that distress can adversely affect the acquisition of competency and skills (Dinsmore et al., 2001; Thomas et al., 2007; Nas et al., 2011).

The vast majority of medical schools devote more than half of their Anatomy curriculum time to the dissection laboratory (Lempp, 2005). However, a number of medical schools have either removed the practical hands-on aspect of dissection or are seriously considering such a measure (Ashdown et al., 2013).

Teaching anatomical sciences at Oakland University William Beaumont (OUWB) School of Medicine has been under continuous review in the past few years, ranging from full integration into organ-system blocks, to discipline-based approaches. In line with recommendations of the Association of American Medical Colleges (AAMC), students' feedback and perceptions constituted important elements for consideration in such curricular reviews. The AAMC recommendations stress self-learning and interactive teaching strategies.

This study aimed at investigating the perceptions and attitudes expressed by medical students at our school, who have been recruited from various cultural backgrounds, regarding cadaver dissection. It is meant to highlight the importance of dissection in the acquisition of anatomical knowledge. Further, it considers strategies for enhancing skills of future physicians despite their anxiety. This study also aims to show the importance of time spent on the practical aspect of anatomy dissection that should remain as an integral part of medical schools' curricula.

Methods

Study design

First year medical students ($n = 100$) were informed about the nature of the study and were invited to participate by completing a questionnaire anonymously. The questionnaire was administered twice: one week after the student's first encounter with the cadaver, and again at the end of the anatomy course. The questionnaire contained five sections: (1) demographics; (2) appraisal of the dissection experience using a modified "Appraisal of Life Events Scale" (Ferguson et al., 1999); (3) assessment of stress indicators, nausea, and anxiety (Carroll et al., 2002); (4) assessment of coping strategies using the COPE questionnaire (www.psy.miami.edu/faculty/ccarver/scCOPEF.html); and (5) assessment of the impact of dissection on learning outcomes (Carver et al., 1997).

Ethical considerations

The study design and questionnaire content were approved by the Institutional Review Board at OUWB School of Medicine. In complying with the highest standards of ethical considerations, participants were informed that their participation was entirely voluntary and that they could omit questions they preferred not to answer. All data emanating from survey was kept confidential.

Statistical analysis

Data entry and analysis were conducted using Statistical Package for Social Sciences SPSS 20.0 (SPSS Inc, Chicago, IL). Data were presented as mean \pm standard deviation for continuous variables and as percentages for categorical variables. Proportions from both time points were compared using Chi Square test. Results with a p-value less than 0.05 were considered significant.

Results

Characteristics of participants

Medical students at OUWB School of Medicine are admitted from various cultural backgrounds. The response rate was 40% (n = 40) in both time points. The male to female ratio was 5.5:4.5 with 60% of the total sample between 22-24 years of age. Only 17.5% of the students have had a previous experience with human cadaver dissection before the start of dissection in medicine I year.

Appraisal of the dissection experience

The participants showed a clear positive appraisal of the importance of gross anatomy laboratory (Tab. 1A) and described the experience as interesting (47.5%), informative (97.5%), challenging (97.5%), stimulating (92.5%), exciting (90%), enjoyable (80%), and even exhilarating (72.5%). The commonly noted and reported negative aspects of dissection were not highlighted by the students. On the contrary, they considered the experience as bearable (100%), not painful (85%), not nauseating (82.5%), not depressing (70%) nor scary (67.5%). Nevertheless, a good proportion agreed that dissection is emotional (47.5%) and anxiety provoking (42.5%) at the beginning of the course.

This perception changed significantly ($p < 0.05$) at the end of the course where less students reported the experience to be anxiety provoking (15% vs 42.5%), emotional (29% vs 47.5%), but still challenging (100%) and interesting (100% vs 47.5%, $p < 0.05$), (Tab. 1B).

The role of cultural identity in shaping the cadaveric dissection experience

Even though more than half of the respondents reported a set of cultural views (55%), and indicated that their culture was important to them (67.5%), only a minority described their cadaver laboratory experience as shaped by their cultural views

Table 1A – Students perceptions towards cadaveric dissection experience at the beginning of the course.

Category	Disagree n (%)	Agree n (%)
Nauseating	33 (82.5)	3 (7.5)
Scary	27 (67.5)	8 (20.0)
Painful	34 (85.0)	2 (5.0)
Depressing	28 (70.0)	3 (7.5)
Unbearable	40 (100.0)	0 (0.0)
Anxiety provoking	17 (42.5)	17 (42.5)
Emotional	15 (37.5)	19 (47.5)
Enjoyable	1 (2.5)	32 (80.0)
Challenging	0 (0.0)	39 (97.5)
Stimulating	1 (2.5)	37 (92.5)
Exhilarating	2 (5.0)	31 (72.5)
Information	0 (0.0)	39 (97.5)
Exciting	0 (0.0)	36 (90.0)
Interesting	0 (0.0)	19 (47.5)

Table 1B – Students perceptions towards cadaveric dissection experience at the end of the course.

Category	Disagree n (%)	Agree n (%)
Nauseating	32 (78.0)	4 (10.0)
Scary	37 (90.0)	4 (20.0)
Painful	34 (83.0)	2 (5.0)
Depressing	27(66.0)	3 (7.0)
Unbearable	38 (93.0)	0 (0.0)
Anxiety provoking	34 (83.0)	6 (15.0)
Emotional	14 (34.0)	12 (29.0)
Enjoyable	4 (10.0)	29 (71.0)
Challenging	0 (0.0)	41 (100.0)
Stimulating	0 (0.0)	36 (88.0)
Exhilarating	5 (12.0)	23 (56.0)
Information	0 (0.0)	39 (97.5)
Exciting	2 (5.0)	34 (83.0)
Interesting	0 (0.0)	41 (100.0)

Table 2 – Role of cultural identity in shaping the cadaveric dissection experience at the beginning of the course

Category	Disagree n (%)	Agree n (%)
Identify with a set of cultural views	9 (22.5)	22 (55.0)
My culture is important to me	4 (10.0)	27 (67.5)
My culture views impacted my experience in the dissection	24 (60.0)	8 (20.0)
My culture views and my religion views are very closely related	16 (40.0)	16 (40.0)
The concept of human mortality is frightening	21 (52.5)	14 (35.0)
Most of my classmates with whom I am friends are of the same background as me.	22 (55.0)	3 (7.5)
Cultural consideration should be part of the gross anatomy	15 (37.5)	16 (40.0)
Cadaver dissection helps me develop emotionally	7 (17.5)	18 (45.0)
I often speak with others about my experience in the dissection lab.	6 (15.0)	26 (65.0)

(20%). Despite that, some supported the idea of having cultural considerations as part of the Gross Anatomy course (40%) (Tab. 2). It is interesting to note that at the end of the course, cultural and religious views remained important, in respect to dissection, except that the cultural and religious views became significantly more closely related ($p < 0.05$).

Coping with cadaveric dissection

In general, the majority of students were coping well by accepting the fact that dissection is happening (62.5%) and seeing good in what is happening (62.5%). Half of them were trying to see dissection in a different light to make it seem more positive (50%), and some were getting emotional support from others (20%) and getting help and advice from other people (32.5%). Some were taking action to make the situation better and performing activities to take their mind off from things (20%): going to movies, shopping, TV, or engaging in similar activities (Tab. 3).

Many students (25%) found comfort in their religion and spiritual beliefs. About half of them simply learned to live with it (47.5%) (Tab. 3). At the end of this course, the responses were similar; however, the students were more familiar with dissection and did not need to engage in extracurricular activities as much as before. It is satisfying to find that none of the participants blamed his/her decision to study medicine nor impugned the importance of the experience.

Table 3 – Strategies to cope with human cadaveric dissection.

Category	Disagree n (%)	Agree n (%)
Turning to the activities to take my mind off things	24 (60.0)	8 (20.0)
Concentrating my efforts on doing something about the situation I am in.	17 (42.5)	8 (20.0)
Saying to myself “this is not real”	37 (92.5)	1 (2.5)
Getting emotional support from others	20 (50.0)	8 (20.0)
Taking action to try to make the situation better	20 (50.0)	8 (20.0)
Refusing to believe that it is happening	33 (82.5)	0 (0.0)
Saying things to let my unpleasant feelings escape	31 (77.5)	5 (12.5)
Getting help and advice from other people	24 (66.0)	13 (32.5)
Trying to see it in a different light to make it seem more positive	14 (35.0)	20 (50.0)
Criticizing myself	27 (67.5)	6 (15.0)
Trying to come up with a strategy about what to do	23 (57.5)	8 (20.0)
Getting comfort from someone	21 (52.5)	6 (15.0)
Giving up the attempt to cope	31 (77.5)	1 (2.5)
Looking for Strategy good in what is happening	8 (20.0)	25 (62.5)
Making jokes about it	24 (60.0)	7 (17.5)
Going to movies, TV, shopping or others	30 (75.0)	7 (17.5)
Accepting the reality of the fact that it has happened	6 (15.0)	25 (62.5)
Expressing my negative feeling	23 (57.5)	6 (15.0)
Find comfort in my religion or spiritual beliefs	19 (47.5)	10 (25.0)
Learning to live with it	7 (17.5)	19 (47.5)
Thinking about what steps to take	18 (45.0)	7 (17.5)
Blaming myself to study medicine	34 (85.0)	0 (0.0)
Praying or meditating	26 (65.0)	8 (20.0)
Making fun of the situation	33 (82.5)	4 (10.0)

Table 4 – Effect of dissection experience on anatomy course learning outcomes.

Category	Disagree n (%)	Agree n (%)
Promotes team work	1 (2.5)	35 (87.5)
Promotes familiarity with the human body	0 (0.0)	39 (97.5)
Enhances combination of theory and practice	1 (2.5)	37 (92.5)
Promotes practical skills	1 (2.5)	34 (85.0)
Promotes preparation for work practice	1 (2.5)	35 (87.5)
Promotes attitudes that increase the respect of the body	1 (2.5)	35 (87.5)
Dissection promotes the spirit of organ donation	3 (7.5)	28 (70.0)
Has the potential to widen the spectrum of learning outcomes, which are essential to future doctors.	1 (2.5)	36 (90.0)
Promotes the development of psychomotor skills in preparation for clinical work.	3 (7.5)	31 (77.5)

The impact of cadaveric dissection on the anatomy course learning outcomes

Data in Table 4 support the importance of dissection based on all nine parameters tested and related to the anatomy course learning outcomes. Students agreed that dissection promotes familiarity with human body (97.5%), enhances practical skills (85%), fosters preparation for practical work (87.5%), increases combination of theory and practice (92.5%), and promotes team work (87.5%) (Tab. 4).

Moreover, they reported that cadaveric dissection has the potential to widen the spectrum of anatomy learning outcomes (90%), enhances the development of psychomotor skills in preparation for clinical work (77.5%), fosters the spirit of organ donation (70%), and above all promotes appreciation of the human body (77.5%) (Tab. 4). These positive perceptions were reinforced in the students' responses at the end of the course, without significant differences.

Discussion

Data emanating from this study reflected the importance of the dissection experience for first year medical students. The result indicated a positive perception towards the dissection experience that was described as beneficial, enjoyable, and interesting. The cultural identity shaped the student's perceptions of the cadaveric dissection experience especially towards the end of the course. In order to cope better with this challenging experience, some students asked for advice from others, engaged in extra-curricular activities, and practiced religious or spiritual rituals. Last but not least, the students perceived the dissection experience as having a great impact on the learning outcomes of the anatomy course on all nine parameters tested. Such findings are in agreement with several published data (Lempp, 2005; Ashdown et al., 2013).

In this study, the participants found the dissecting experience to be stimulating and challenging and further found that it promotes appreciation of the human body. This is in line with the findings of another study showing that the dissection experience awakens the conscious awareness of students and influences their problem solving ability. Those two attributes are necessary in order to endorse the ethics of professionalism (Egwu et al., 2008), which is a major goal of today's medical curriculum.

It was impressive that none of the participants found the experience to be unbearable nor very depressing. The majority adapted very quickly by using various coping strategies. However, there were mixed feelings regarding the emotional aspect and resulting anxiety. Those issues could be subject to more discussion by the anatomy course directors and curricular experts (Evans and Fitzgibbon, 1992; Nondim, 1996; Tschering et al., 2000; O'Reilly, 2011). In fact, those issues were recognized in other studies which reported that students found the experience to be frightening at the beginning of the course (Naz et al., 2011). Interestingly, in this study, the students found the experience to be less anxiety provoking at the end of the course, which goes along with a study that described a "ritual transformation" taking place during dissection classes (Hafferty, 1988). Some studies also reported that many of the students expressed some level of fear at the beginning but this decreased significantly at the end of the course (Abu-Hijleh et al., 1997; Naz et al., 2011). Actually, a similar trend was encountered in this study.

The positive effect of cadaveric dissection on the learning outcomes was significant and highly praised by a majority of students. According to the students, the dissection experience promotes practical skills and integrates the theoretical and practical knowledge. It also enhances professionalism by fostering team work and psychomotor skills as well as the humane approach to the donated body. As such, this study, along with others in the same field, strongly endorses the importance of having cadaver dissection in the curriculum and shows that omitting this experience is a loss for the students (Moxham and Moxham, 2007; Ashdown et al., 2013).

Someone has said that the cadaver is the medical student's first "patient". The student is not attempting to cure this "patient" or make him feel better but rather the student is going to study each and every part of the body with the strong hope that this will help him/her to understand living patients in the future. One student wrote: "Personally, I treat my cadaver with the utmost respect and am able to feel comfortable with the body because I am ultimately extremely grateful for the gift".

Such questionnaires given to first year medical students encourage reflection on their dissection experience and introduces them to life and death concepts (Dempster et al., 2006). Most of these students were not part of the medical profession just a few months ago. Now they are suddenly faced with a fellow human being, and they are expected to cut away structures that once performed the essential functions of life (O'Reilly, 2011). This very intimate encounter with a cadaver affects many medical students emotionally. The questions are how to deal with those feelings and how to approach the students (Home et al., 1990; Carroll et al., 2002). Some of the students in the study helped themselves by getting emotional support and seeking advice from other people. In this context, it is suggested that an introductory social behavioral and ethical course be presented at the beginning of the medical curriculum, preceding or running along with the anatomy course.

Conclusion

The results of this study might guide curriculum designers to prove that dissection represents a core element of the medical curriculum. They might find that dissection is vital to the skills bank of future physicians despite the unpredicted emotional experience. Desensitization programs could be made available for students, especially those who experience adverse emotional and stress reactions.

Limitations

Some limitations in the study include the sample size resulting from a 40% response rate. Another limitation is that the study is a cross sectional survey done for one class. Finally, there is no inferential statistics done as this study aims to be descriptive and to highlight the importance of cadaver dissection at a time where many medical schools are considering omitting it from their curricula.

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