
A Peer-Led Anatomy Dissection Experience for Second-Year Medical Students

Priyanka Pandey, MS¹, Jenny Kaiser, BS¹, Karen Wines, MS¹, Kristin Stover, PhD²

¹Department of Biomedical Science, West Virginia School of Osteopathic Medicine, Lewisburg, WV, USA

²Department of Biomedical Education & Anatomy, The Ohio State University College of Medicine, Columbus, OH, USA

Corresponding author: kwines@osteo.wvsom.edu

Abstract

In the fall of 2021, a cohort of second-year osteopathic medical students took part in a regional dissection experience led by their peers. During the students' first year of medical school, when they would have normally participated in anatomy dissections, they instead took part in a prosection-based gross anatomy course due to COVID restrictions. Many students requested the opportunity to learn dissection techniques, dissect regions of interest for specialties, and participate in this medical school "rite of passage" when COVID restrictions eased. This article describes the planning and implementation of a regional dissection program for 42 second-year medical students that occurred outside normal curricular hours at the West Virginia School of Osteopathic Medicine (WVSOM). This program was led by two second-year osteopathic medical students who had previously performed a full donor dissection as well as assisted in teaching at the college level. One of the main advantages of this program was the use of a limited number of donors compared to the large number of students who were able to participate in dissection in a meaningful way. A disadvantage was that each pair of students was only able to dissect one region of the body during their sessions. A quality improvement survey was conducted after the experience and 26% of participants provided feedback for potential future programs at WVSOM. Students reported enjoying the experience and becoming more comfortable using dissection instruments. This dissection program could be used as a template for an anatomy elective, a brief introduction to dissection, or a summer course. <https://doi.org/10.21692/haps.2023.005>

Key words: gross anatomy dissection, peer learning, elective, mini-dissection experience, cadaver dissection

Introduction

The COVID-19 pandemic drastically changed the way that medical schools presented curriculum to their students (Hilburg et al. 2020; Kaul et al. 2021). Similarly to what occurred at many other institutions (Iwanaga et al. 2021; Papa et al. 2022), human dissection was the one part of the curriculum that changed the most drastically for the class of 2024 at the West Virginia School of Osteopathic Medicine (WVSOM). Due to COVID restrictions, the class was not able to participate in traditional dissections as first-year medical students. Rather, they participated in a small group prosection-based course.

Once the campus community was able to receive vaccines, a number of students from the class of 2024, now in their second year, requested a dissection experience. Many of them mentioned specific areas they would like to dissect, due to interests in specialties such as orthopedics and cardiology. This presented a challenge because most of the anatomy laboratory space is devoted to the first-year anatomy curriculum. The officers of the Atlas Club, the WVSOM anatomy club devoted largely to creating mock-practical exams for first year students, took on this challenge.

Collectively, it was felt that providing a dissection experience for these second-year medical students who were willing to take time above and beyond their normal curricular hours to learn anatomy, was a worthwhile endeavor. One study reported that medical students feel that the time-intensive aspect of dissection is a barrier to their participation in the practice (Whelan et al. 2018). Having a group of students willing to dedicate what little time they had to this experience showed how important it was to them. Another study highlighted the importance of dissection specifically for anatomical medical specialties (Wisco et al. 2015). Like our students, these students also requested specific regions for dissection based on specialty interest. Human dissection is an irreplaceable opportunity that is vital to many aspects of medical education and is crucial to these students' professional development (Ghosh 2017).

Most dissection-based anatomy education programs had to resort to virtual or prosection-based courses during the beginning of the pandemic. It remains unclear how this will affect anatomy knowledge retention, spatial awareness, and practical skills in this student population. Studies have shown

continued on next page

participation in dissection is beneficial to many aspects of professional training. The most immediate benefit, of course, is that students have enhanced performance on anatomy-based knowledge assessments (Whelan et al. 2018). However, there are many other advantages to anatomical dissection (Ghosh 2017), including understanding complex spatial relationships, active involvement in learning, understanding morphological variation, building communication skills, and dealing with the stress of the medical world surrounding death and dying (Robbins et al. 2009; Singh and Kharb 2013; Willan and Humperson 1999). The body donor can be viewed as teacher and/or first patient who furthers the emotional development of students by teaching them respect and empathy (Bohl et al. 2011).

Ultimately, an opportunity for 42 second-year medical students to participate in human dissection was created. The purpose of this article is to describe how this regional dissection program was planned and implemented. This type of dissection experience may lend itself as a model for anatomy courses with large enrollments combined with limited time, space, and donors. This article will highlight challenges that were encountered during the planning and working sessions, as well as how they were circumvented. It will also discuss the benefits and shortcomings of the program for the second-year WVSOM students who participated, some of whom volunteered their feedback when the program concluded.

Methods/Program Description

The four authors of this article include the two medical student peer leaders and the two anatomy faculty advisors for the project. The logistics of this regional dissection program relied heavily on the number of students who wished to participate outside of normal medical school

curricular hours. To determine participation, interest was gauged via email from the WVSOM class of 2024, a total of 197 students. Approximately 50 students expressed interest in taking part in the experience. Based on this number, a proposal was put together for approval through the WVSOM Human Gift Registry to secure donors and laboratory space. Four donors were dedicated to this project and were housed in the anatomy lab along with the donors being dissected by the first-year class (class of 2025). The decision to have only four donors for this project was based on a space limitation within the anatomy lab. Once our program was complete, these four donors were then used for prosections for the first-year class in the spring of 2022 so that students could continue to learn from them.

Once institutional approval was completed through both the WVSOM Human Gift Registry and Student Life Office, a schedule and syllabus were compiled, as required for student organization educational events. Students were divided into groups in accordance with WVSOM COVID protocols. Students were assigned to the four donors, with 12 to 13 students working on each, but only 4 to 6 students present at the table during any given dissection session. Two or three students were assigned to one of the following regions of the body that they would be working on until completion: upper extremity, lower extremity, head/neck, abdomen/pelvis, or thorax (Table 1). Each team had a total of 4 dissection sessions, each lasting 2 hours (Table 2). To follow an example, if you were on Team 1 assigned to the upper limb on donor number 1, you would have attended sessions 2, 4, 6, and 8. Each session ran for 2 hours in the evening after academic obligations. Students were welcome to come into the lab on their own time if dissections were not completed within a given session.

Region	Donor 1	Donor 2	Donor 3	Donor 4
Upper Limb	Team 1 (3)	Team 2 (2)	Team 3 (3)	Team 4 (3)
Lower Limb	Team 5 (2)	Team 6 (2)	Team 7 (2)	Team 8 (2)
Thorax	Team 9 (2)	Team 10 (2)	Team 9 (2)	Team 10 (2)
Abdomen	Team 11 (2)	Team 12 (2)	Team 13 (2)	Team 14 (2)
Head and Neck	Team 15 (2)	Team 16 (2)	Team 17 (2)	Team 18 (2)

Table 1. Team assignments (number of student participants in parentheses). Each team completed four dissections in the indicated region.

continued on next page

	Upper Limb	Lower Limb	Thorax	Abdomen	Head & Neck
Dissection 1	back <i>Session 2</i>	gluteal region and posterior thigh <i>Session 2</i>	skin thorax, muscle identification <i>Session 1</i>	abdominal muscles <i>Session 1</i>	Skin neck <i>Session 3</i>
Dissection 2	arm and axilla <i>Session 4</i>	anterior thigh <i>Session 4</i>	rib cage removal & heart <i>Session 3</i>	celiac trunk <i>Session 3</i>	triangles of the neck <i>Session 4</i>
Dissection 3	brachial plexus and forearm skinning <i>Session 6</i>	anterior and posterior leg <i>Session 6</i>	posterior thoracic wall <i>Session 5</i>	superior/ inferior mesenteric arteries <i>Session 5</i>	face and eye <i>Session 5</i>
Dissection 4	forearm and hand <i>Session 8</i>	foot <i>Session 8</i>	clean up dissection & review <i>Session 6</i>	posterior abdominal wall <i>Session 7</i>	brain removal <i>Session 7</i>

Table 2. Each regionally assigned team participated in 4 sessions covering the indicated material.

Prior to the start of the first session, the participants were emailed a presentation that is normally given to first-year students on their first day in the anatomy laboratory, modified based on the activities specific to this dissection experience. The presentation included the location of supplies within the laboratory, proper scalpel blade disposal technique, tissue removal, storage locations, workstation cleaning, and proper donor care. One staff member was present in the lab during the first few sessions to be sure that students knew the procedures and had all the necessary tools and equipment. The two peer leaders were present during all sessions to answer questions, guide dissections, and help with any student needs. Students also had access to the laboratory handouts used in the WVSOM curriculum for each region of dissection, referencing Grant's Dissector (Detton 2021). Many different anatomy atlases, including Grant's Dissector, were available in the lab.

Peer instructors began each laboratory session by briefly reviewing what each group was going to dissect that day with any helpful tips. Once each group started, the peer

instructors would rotate from table-to-table teaching dissection techniques, answering questions about structures, and discussing clinical correlations. Since the students were well into their second year of pre-clinical curriculum, all the anatomy content was review and they were able to relate the dissection to previously studied material.

To determine the success of the regional dissection experience and any changes that would need to be made if a similar program were to take place in the future, a survey (Table 3 and 4) was sent out to the students who participated. As a Quality Assurance/Quality Improvement Project, it did not meet the regulatory definition of research and did not require IRB review. The survey consisted of 20 questions in total: 13 of the questions asked the students to rank different aspects of their experience on a strongly agree to strongly disagree Likert scale. There were two questions about their previous level of anatomy experience and 5 open-ended response questions.

continued on next page

Survey Question	Mean Response (\pm SD)
1. My time dissecting helped me understand the anatomy of my assigned region in greater detail.	4.6 \pm 0.5
2. This experience helped me make clinical connections in the body region I dissected.	4.5 \pm 0.9
3. I felt more comfortable using dissection tools after participating in the dissection.	4.9 \pm 0.3
4. I gained a better three-dimensional perspective of structures.	4.6 \pm 0.9
5. I gained a stronger appreciation for human body donation.	4.7 \pm 0.6
6. I gained a stronger appreciation for anatomical variations.	4.5 \pm 1.0
7. I enjoyed the dissection experience.	4.8 \pm 0.4
8. This experience made me consider alternative specialties.	3.2 \pm 0.9
9. This experience was a waste of my time.	1.2 \pm 0.4
10. This experience aided in my understanding of how structure and function are related.	4.2 \pm 1.0
11. The WVSOM anatomy facilities provided a favorable learning environment.	4.6 \pm 0.7
12. Peer learning enhanced my understanding during dissection.	4.7 \pm 0.6
13. The time commitment was not a burden on my schedule.	4.1 \pm 0.5

Table 3. Mean level of agreement (\pm SD) to Likert-based survey questions answered by students after they had completed the regional dissection experience. (1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree. (n=11).

Open-Ended Survey Question	Summarized Responses
How did your time in lab aid in your integration of anatomy with other disciplines?	<ul style="list-style-type: none"> • structure and function • special relationships, • delicate touch for some surgeries
How did it aid in your clinical understanding of anatomy?	<ul style="list-style-type: none"> • consequences of pathology in certain regions/ structures • anatomical variation
What did you like most about this dissection experience?	<ul style="list-style-type: none"> • working with a team • testing each other's knowledge • practice with tools (ex. Scalpel) • deepening anatomy knowledge • seeing variation • fun and relaxed atmosphere
What did you not like about this dissection experience?	<ul style="list-style-type: none"> • too many people around the donor • not enough tools for everyone to work • not enough instruction
How should we improve the program?	<ul style="list-style-type: none"> • more time in the lab • offer more regions to dissect

Table 4. Summarized student responses (key phrases) to open-ended survey questions soliciting feedback for program improvement.

continued on next page

Survey Results

Of the 42 students who participated in the regional dissection experience, 11 (26.2%) participated in the follow-up quality improvement survey for the program. The Likert scale survey questions, average responses and standard deviation can be found in Table 3. Only two of the 11 had participated in a human dissection course prior to this experience. The free response questions are outlined in Table 4 along with a summary of student responses.

The benefit cited most highly by the students was feeling more comfortable using dissection tools after the experience (Table 3). They also strongly agreed that peer learning enhanced their understanding during dissection, and they gained a stronger appreciation for human body donation, despite having participated in a prosection course and learning from donors the previous year. The students had a neutral response to the dissection experience stimulating them to consider alternate specialties, and all students that responded to the survey disagreed that the experience was a waste of their time.

Discussion

Overall, the second-year regional dissection experience was a positive experience for most of the students involved. Peer instructors observed that students enjoyed themselves without the pressures of being graded on the material. Students were free to explore the variability of human anatomical structures. In the post-experience survey, second-year WVSOM students strongly agreed that they understood the anatomy of their assigned region in more detail, made clinical correlations, felt more comfortable with dissection tools, gained a better 3-D understanding, and acquired a stronger appreciation for human body donation and anatomical variation. These results are similar to the results of other student feedback surveys following voluntary dissection experiences (Larkin and McAndrew 2013). It is recognized that students who chose to participate in the follow up survey may have felt the strongest about the experience, but the authors feel that the results provide validation for the program, nonetheless. By the end of the regional dissection program, peer leaders noted that the students were more confident and needed less and less instruction, as is often noted in a full dissection course.

Challenges

Some minor challenges were encountered while implementing the program. Trying to schedule the sessions around all the other campus events, exams, first year open labs, and mock practical exams, was the first major hurdle. Additionally, students are often part of a number of clubs. The schedule was created to not interfere with any of them for maximum attendance.

Logistically there were a few issues with students not showing up for the session without notification. This led to an uneven workload distribution when working in pairs. Peer leaders did their best to modify groups in the moment, for example moving someone from a group of three to fill in the gap. Since students were not graded on these activities, there was little incentive to attend other than the student's own desire to learn. One or two students generally missed each session out of the 16 to 24 expected students. Only two students dropped from the program. One student dropped out the day before sessions began and the slot was filled with a student who was previously undecided about participating. Another student did not attend any of the sessions and was unresponsive to email requests. One potential benefit of having no graded assignments was that students may have been more willing to fill in where needed and shift regions for a dissection day.

The two peer leaders found it difficult to have three groups at a table, dissecting different regions all at once. At times, there were 12 teams dissecting simultaneously, making it difficult to rotate through them quickly enough during a two-hour session. During the de-brief, the idea to have all the teams assigned to one region begin in the lab with slightly staggered start times was discussed. This would enable a slightly longer introduction to the day's goals for that group and ease some of the early questions. In the future, recruiting additional peer-leaders to facilitate during each session would help with this burden.

Skin, fat, and fascia removal always poses a challenge for new dissectors. It was especially challenging for students starting on certain regions such as the neck or gluteal region and required more hands-on time by the peer leaders. Teaching often revolved around the mechanics of dissection, and, again, having more instructors would be valuable to make the most use of lab time. Additionally, with a limited number of donors, there were issues of certain pathologies preventing full dissections of desired regions. Peer leaders often had groups visit other tables to share findings when a group was unable to see structures on their own donor. Since there was no accompanying didactic content, the students had to rely more on each other to remember and discuss pertinent material.

To not overburden the students, each person attended only eight total hours of dissection. For certain regions, such as head and neck, this was a relatively short dissection period. Time was a difficult balance that should be closely evaluated for this type of regional dissection program, as many groups may feel they are at a disadvantage, especially if there are grades involved. It was not crucial that everything be dissected to absolute completion, and often the dissections were not done bilaterally. This later allowed for the donors to be used as prosections for the first-year dissection labs.

continued on next page

Benefits

Forty-two students, many of whom had never had the opportunity to work with a donor, were able to learn dissection techniques and review anatomy through this program. In the survey results, all of the students disagreed that it was a waste of their time. Peer leaders reported a very positive working environment during the sessions, observing strong teamwork and self-directed learning among the participants. Students seemed to have a particularly good disposition, as observed by the peer leaders, perhaps because this was a rare ungraded, pressure-free activity. Peer leaders enjoyed the experience of helping their peers in this relaxed environment. The timing of the program was also nice because it allowed students to refresh their anatomy with a hands-on activity before beginning their dedicated board study time.

From a faculty perspective, it is felt that this relatively short dissection program still achieved some of the same desired outcomes as the full dissection experience, such as peer-learning, problem solving, and discussion of clinical correlations in conjunction with the anatomy. The students gained confidence in their skills, which seemed to be particularly important for those wanting to pursue specialties in their area of dissection. While the donor may not have been these students' 'first patient', it was certainly impactful. The survey participants reported a stronger appreciation for human body donation, three-dimensional perspectives, and anatomical variation. This shows growth of both empathy and comfort when it comes to maneuvering the human body through dissection.

Peer-learning

This dissection experience was student led from the start, by two dedicated second-year medical students instructing their own cohort. These student doctors were in charge of the entire educational aspect of the experience and most of the logistics. Peer-assisted dissection has been shown to encourage active participation in dissection and even help students achieve higher academic scores (Han et al. 2015). Other institutions have adopted some form of near-peer learning, which may be closer to this experience since the student instructors had prior dissection experience. Near-peer learning has been shown to be beneficial to the students because the peer tutors can communicate with the student learners more effectively, and beneficial for instructor development both in learning anatomy at a deeper level, as well as honing teaching skills (Evans and Cuffe 2009). As previously reported by others, both peer leaders felt that it helped prepared them as they approached their own board exams, and our survey participants reported that peer learning enhanced their understanding during dissection (Han et al. 2015). Even in a larger class, it may be worthwhile to identify students with prior anatomy and dissection experience and disperse them evenly throughout dissection groups.

Concluding Remarks

Our regional dissection program filled a curricular and experiential gap for second-year students post COVID-19 restrictions. This regional dissection series can serve as a template for any time-limited or resource-limited anatomy dissection program, including a short-course, boot camp, elective, or summer experience. Only four donors were dissected by a total of 42 students over the course of eight total sessions, making good use of the time and resources available via overlapping team dissections.

Supplemental learning opportunities could easily be added. For example, students could present their regional dissection and some associated clinical correlations to other dissection groups. This could also be developed into a service-learning program where medical students teach visiting students from other educational programs and are assessed on their presentation skills and reflection of their involvement. Both of our peer-leaders had prior dissection and teaching experience. However, if the program were to be run with new educators, we would suggest a brief teaching orientation focusing on how to guide new dissectors and encourage collaboration among the participants. Overall, this program was extremely successful and based on the survey, there were many positive outcomes for the participants.

Acknowledgments

We would like to thank the WVSOM Human Gift Registry for their support on this endeavor, the use of donors, as well as Bobbi Morgan and Kevin McCraw for their help with this program.

About the Authors

Priyanka Pandey, MS, is a third-year medical student at the West Virginia School of Osteopathic Medicine (WVSOM) and is interested in anesthesia. She attended Ohio State University where she earned her bachelor's degree in microbiology and master's degree in Anatomy. Jenny Kaiser, BS, is a third-year medical student at WVSOM. She earned her bachelor's degree in biomedical science from Missouri Southern State University and is interested in a career in urology. Karen Wines, MS, is an instructor and Director of Student Portfolios in the Department of Biomedical Sciences at WVSOM. She teaches gross anatomy and histology and oversees an anatomical outreach program. Kristin Stover, PhD, is an assistant professor and Director of Undergraduate Anatomy Education at Ohio State University College of Medicine. Previously she held an assistant professor of anatomy position at WVSOM. She is a member of the Human Anatomy and Physiology Society (HAPS).

continued on next page

Literature Cited

- Bohl M, Bosch P and Hildebrandt S. 2011. Medical students' perceptions of the body donor as a "first patient" or "teacher": A pilot study. *Anat Sci Educ* 4(4):208-213. <http://doi.org/10.1002/ase.231>
- Detton AJ. 2021. Grant's Dissector, 17th edition. Philadelphia (PA): Wolters Kluwer.
- Evans DJR, Cuffe T. 2009. Near-peer teaching in anatomy: An approach for deeper learning. *Anat Sci Educ* 2(5):227-233. <http://doi.org/10.1002/ase.110>
- Ghosh SK. 2017. Cadaveric dissection as an educational tool for anatomical sciences in the 21st century. *Anat Sci Educ* 10(3):286-299. <https://doi.org/10.1002/ase.1649>
- Han E-R, Chung E-K, Nam K-I. 2015. Peer-assisted learning in a gross anatomy dissection course. *PLoS One* 10(11):e0142988. <http://doi.org/10.1371/journal.pone.0142988>
- Hilburg R, Patel N, Ambruso S, Biewald MA and Farouk SS. 2020. Medical education during the coronavirus disease-2019 pandemic: Learning From a distance. *Adv Chron Kidney Dis* 27(5):412-417. <https://doi.org/10.1053/j.ackd.2020.05.017>
- Iwanaga J, Loukas M, Dumont AS and Tubbs RS. 2021. A review of anatomy education during and after the COVID-19 pandemic: Revisiting traditional and modern methods to achieve future innovation. *Clin Anat* 34(1):108-114. <https://doi.org/10.1002/ca.23655>
- Kaul V, Gallo de Moraes A, Khateeb D, Greenstein Y, Winter G, Chae J et al. 2021. Medical education during the COVID-19 pandemic. *Chest* 159(5):1949-1960. <https://doi.org/10.1016/j.chest.2020.12.026>
- Larkin TA and McAndrew DJ. 2013. Factors influencing students' decisions to participate in a short "dissection experience" within a systemic anatomy course. *Anat Sci Educ* 6:225-231. <https://doi.org/10.1002/ase.1323>
- Papa V, Varotto E, Galli M, Vaccarezza M, Galassi FM. 2022. One year of anatomy teaching and learning in the outbreak: Has the Covid-19 pandemic marked the end of a century-old practice? A systematic review. *Anat Sci Educ* 15(2):261-280. <https://doi.org/10.1002/ase.2162>
- Robbins BD, Tomaka A, Innus C, Patterson J, Styn G. 2009. Lessons from the dead: The experiences of undergraduates working with cadavers. *Omega (Westport)* 58(3):177-192. <https://doi.org/10.2190/om.58.3.b>
- Singh V, Kharb P. 2013. A paradigm shift from teaching to learning gross anatomy: meta-analysis of implications for instructional methods. *J Anat Soc India* 62(1):84-89. [https://doi.org/10.1016/S0003-2778\(13\)80019-6](https://doi.org/10.1016/S0003-2778(13)80019-6)
- Whelan A, Leddy JJ, Ramnanan CJ. 2018. Benefits of extracurricular participation in dissection in a prosection-based medical anatomy program. *Anat Sci Educ* 11(3):294-302. <https://doi.org/10.1002/ase.1724>
- Willan PL, Humpherson JR. 1999. Concepts of variation and normality in morphology: Important issues at risk of neglect in modern undergraduate medical courses. *Clin Anat* 12(3):186-190. [https://doi.org/10.1002/\(SICI\)1098-2353\(1999\)12:3<186::AID-CA7>3.0.CO;2-6](https://doi.org/10.1002/(SICI)1098-2353(1999)12:3<186::AID-CA7>3.0.CO;2-6)
- Wisco JJ, Young S, Rabedeaux P, Lerner SD, Wimmers PF, Byus C, Guzman CR. 2015. Student perceived value of anatomy pedagogy, part I: Prosection or dissection? *J Med Educ Curric Dev* 2:JMECD.S17496. <https://doi.org/10.4137/JMECD.S17496>

