Exploring the Usefulness of Plastinates in Teaching Anatomy

Ann Kendzicky
Grand Valley State University

Follow this and additional works at: http://scholarworks.gvsu.edu/honorsprojects
Part of the Anatomy Commons

Recommended Citation
http://scholarworks.gvsu.edu/honorsprojects/591

This Open Access is brought to you for free and open access by the Undergraduate Research and Creative Practice at ScholarWorks@GVSU. It has been accepted for inclusion in Honors Projects by an authorized administrator of ScholarWorks@GVSU. For more information, please contact scholarworks@gvsu.edu.
Exploring the Usefulness of Plastinates in Teaching Anatomy

Ann Kendzicky
Honors Senior Project

Dissection is the process of disassembling anatomical specimens in order to examine their internal structure. Dissection has been utilized for many years as the predominant method of studying human and animal anatomy in the classroom. While dissection is an excellent method for learning anatomy, it is a messy and time consuming process that requires special equipment, and exposes individuals to harmful chemicals (McLachlan et al. 2004). However, dissection is no longer the only method used to teach anatomy. New technology has provided a variety of opportunities to learn about anatomy without the hassles of dissection. Resources ranging from computer programs with images of real biological specimens, to plastinated humans and animals provide safe, clean models of anatomy that are durable and easily stored compared to traditional wet specimens. Nevertheless, researchers wonder if these resources are sufficient on their own for teaching anatomy, or if they should be used as teaching aids in addition to traditional instruction using dissection.

The use of plastinated biological specimens in teaching anatomy is a topic of interest at many schools and universities. Plastination is a process used to harden dissected human and animal specimens so that they are dry to the touch and protected against decomposition and deterioration. In order to complete the plastination process, all water must be removed from the specimen tissues with a dehydrating solution like acetone (Henry et al. 1996). Next, the specimen is impregnated with liquid silicone polymers under vacuum, then hardened by polymerizing the liquid silicone with a catalyzing agent (Henry et al. 1996). The resulting specimen is hard, dry to the touch, and odorless, compared to traditional biological specimens that must be kept wet and often have strong odors. Other benefits to having dry specimens are that they can be handled without gloves, they are easily stored, and they do not contain dangerous chemicals that are common in solutions used to preserve wet specimens (Douglass and Glover 2003).
In a study looking at the reactions of teachers and students using plastinates in the classroom and the resultant student learning achieved through their use, researchers found that plastinated specimens were enthusiastically accepted by both teachers and students and that they served as valuable teaching tools to improve student learning. The two schools participating in the study used plastinates to teach introductory and advanced biology classes. Students and teachers alike reported strong support for the use of plastinates in the classroom. Many students found it useful to look at them before beginning their own dissections, because it helped them to orient themselves and to avoid removing important anatomical structures that they may have otherwise cut out. The students also thought that the plastinates were easier to handle and they were more willing to spend extra time working with them in comparison to dissected specimens. Teachers liked that plastinated specimens could be used at the spur of the moment during lectures and classroom activities as opposed to dissected or wet specimens that require special planning and materials in order to use them. Instructors also found that having plastinated heightened students interest in learning anatomy and made teaching easier. (Douglass and Glover 2003)

While plastinates were found to be very useful teaching aids, both students and teachers believed that plastinates, while sufficient for teaching introductory biology, should not replace dissection in upper level courses, but should be used to augment dissection (Douglass and Glover 2003). Other studies have also found dissection to be a crucial part of learning anatomy, especially in upper level and graduate courses. In a study investigating the use of computer programs for teaching anatomy to medical students, the group that used cadavers performed better on tests than the group that used computer programs alone (Biasutto et al. 2005). However, a third group that used cadavers and computer programs had the greatest success on exams. These results indicate that, while dissection might be the best method for teaching anatomy, additional resources aid in student learning and help to improve understanding and willingness to learn (Biasutto et al. 2005).

Information about the effectiveness of teaching aids like plastinates and computer programs is
important, because these types of resources are often expensive. Schools need to weigh the pros and cons in order to decide whether to purchase new resources. In the case of plastinates, they have not been found to be a suitable replacement for cadavers in upper and graduate level courses, so they should not be purchased as replacements for cadavers. However, the use of plastinates has been shown to increase student learning and exam scores and, although they are expensive to purchase, plastinates last much longer than wet specimens, because they do not decompose or deteriorate easily. Therefore, if a school can afford to supplement their curriculum with plastinated specimens, they should purchase those specimens that they believe will best augment the anatomy curriculum.

At Grand Valley State University, instructors in the anatomy department have been learning about the usefulness of plastinates for some time. GVSU continues to implement dissection and wet specimen dissection in anatomy courses, however, instructors recognize the usefulness of plastinates and believe that they can be valuable teaching tools for the undergraduate and graduate students taking anatomy courses. The department has acquired a few fully dissected and plastinated specimens, but since these specimens are expensive, they have also taken steps to cut down on the cost of acquiring plastinates. One of these steps has been to purchase permanently donated cadavers that can be dissected by faculty and students for the purpose of being plastinated. Doing this drastically cuts down on costs, because the university does not have to pay for others to perform the dissection. Another step that could be taken to cut costs is to open a plastination laboratory. Grand Valley State is currently working towards this goal, but it will be some time before a GVSU plastination laboratory is opened.

As science and technology advance, new methods for teaching anatomy continue to arise. The introduction of plastinates into the anatomy classroom was an important step in helping students to better understand dissected specimens and to encourage them to spend more time studying course material. While dissection still proves to be an important part of the anatomy curriculum, plastinates will continue to become more prevalent in anatomy classrooms, because of their convenience to both instructors and students, and because they provide real, long-lasting models of anatomical structure.
The Biomedical Sciences Department at Grand Valley State University has recognized the usefulness of plastinates and has begun to build a library of plastinated specimens that will aid in the education of students for years to come.

Works Cited


We had hoped to both dissect and plastinate a head, neck and torso specimen from the University of Michigan for Ann’s Senior Project, but the dissection proved to be a lot more work than anticipated. Ann nearly finished the dissection portion of the project in outstanding fashion- it is an exquisite specimen which will be an essential part of our anatomy teaching materials once it is plastinated, hopefully within the coming year. The following photos illustrate the fine details of Ann’s dissections, even to the untrained eye.  Tim Strickler, Project Advisor
Ann’s dissection of the right thoracic cavity with the right lung removed.

Ann’s novel dissection of the deep structures of the face.

Ann’s detailed dissection of the deep muscles of the back.