

Pulling my gut out – simple tools for engaging students in gross-anatomy lectures

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ABSTRACT

A lecture is not necessarily a monologue, promoting only passive learning. If appropriate techniques are used, a lecture can stimulate active learning too. One such method is demonstration, which can engage learners' attention and increase the interaction between the lecturer and the learners. This paper describes two simple and useful tools for demonstration during gross-anatomy lectures. One is an apron for demonstrating midgut rotation and the other is a simple "human" model for demonstrating the relationship between the uterus and the peritoneum.

Keywords: anatomy teaching, anatomy models, embryology instructions, gut rotation, uterus

NOTES ON CONTRIBUTOR

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INTRODUCTION

Lecturing is still a common practice in medical and health sciences education, although it is often considered to promote passive learning and discourage the higher forms of cognitive learning described in Bloom's Taxonomy, such as application, analysis, synthesis and evaluation (Anderson et al., 2001). In fact, Sir Joseph Barcroft, Chair of Physiology at Cambridge, has defined lecturing as "a process by which information is transferred from the notes of the lecturer to the notes of the student without going through the minds of either" (Book, 1998).

One of the reasons that lecturing has become less popular as a pedagogical strategy is "lecturalgia," which oftentimes results from the teacher's lack of knowledge in how to deliver a good lecture (McLaughlin and Mandlin, 2001). But with appropriate knowledge and skills, we can give stimulating lectures and our students can become more active learners (Brown and Tomlinson, 1979; McLaughlin and Mandlin, 2001; Cantillon, 2003). For example, appropriate questioning during lectures can trigger more active learning in students (Mazur, 2009). Another way of encouraging active learning is through demonstration (Whitman, 1998), which can increase the interaction between the lecturer and the learners, thus turning the lecture from a monologue into dialogue. It also has the advantage of breaking the monotony of a lecture, and regaining the attention of the learners, which is said to last for only 15 to 20 minutes (Stuart and Rutherford, 1978). Described below are two examples of tools that can be used for such demonstrations in gross-anatomy lectures: an apron which is used to demonstrate midgut rotation, and a "human" model of the uterus.

DESCRIPTIONS OF THE TOOLS

The midgut rotation apron

The anticlockwise rotation of the midgut in the developing embryo, with the result that the distal limb of the midgut loop comes to lie anterior to the proximal limb, is a difficult visual concept for learners to grasp. The use of static illustration requires learners to do a lot of mental manipulation. Animation can certainly help. But an even more effective tool is a special apron that can be made from any commercially available solid-colored apron (Figures 1).

The foregut and hindgut are represented by two tubes of equal length, made of a different color fabric from that of the apron. The tubes are glued onto the upper and lower third of the midline of the apron. The midgut is represented by a third tube, with the proximal and distal halves in different colors. It is about five times the length of the foregut tube, but most of it is hidden behind the apron, since it can be retracted through two openings cut in the apron, one at the lower end of the foregut and one at the upper end of the hindgut. When the midgut is retracted, the foregut, midgut and hindgut are aligned. During this demonstration, the lecturer wears the apron and pulls out the midgut tube into a loop in the sagittal plane. To increase the interaction between the lecturer and the learners, the learners can be asked in which direction the midgut loop should rotate. The learners can visually appreciate an anticlockwise rotation of the loop, with the result that the distal half of the loop comes to lie anterior to the proximal half, thus explaining the spatial relationship between the transverse colon and the duodenum in adults.

The ‘human’ model of the uterus

A very effective demonstration of the relationship between the uterus and the peritoneum can be done using a large piece of rectangular cloth which measures approximately 5 feet wide and 11 feet long, depending on the height of the lecturer, with a circular hole in the middle. The lecturer drapes the cloth over his/her body and abducts the arms to ninety degrees, with the head going through the hole in the cloth, so that he/she can still see and continue to speak during the demonstration. Approximately equal lengths of cloth hang down in front of and behind his/her body and abducted arms (Figure 2). In this “human” model of the uterus, the lecturer represents the uterus, and the cloth the peritoneum. The different parts of the uterus are represented by the different body parts of the lecturer: body (body of the lecturer), fundus (head), oviducts (arms), fimbriae (fingers). The double layer of cloth hanging down from the abducted arms of the lecturer thus represents the peritoneum draping over the oviduct to form the broad ligament, with the parametrium sandwiched between the two layers of peritoneum. The lecturer can further elaborate upon this model by, for example, holding a tennis ball in each hand to represent the ovaries. The lecturer can also demonstrate the other uterine ligaments by drawings on the “broad ligament” or by adding other fabric strips.

DISCUSSION

One important method for delivering interesting and effective lectures is to vary the activities in a lecture, which can include brief discussion (e.g., think-pair-share sessions), problem solving, brainstorming, one-minute paper, and demonstration (Brown and Tomlinson, 1979; Whitman, 1998; Cantillon, 2003). These methods can increase the

interaction between the lecturer and the learners and retain the attention of the learners. The tools described in this short communication are some examples of how demonstration can be used effectively in a lecture. When the demonstrations were conducted, the learners appeared to be much more alert and responsive to questions and this provided an excellent opportunity for interaction.

The midgut apron is a more versatile method of demonstrating midgut rotation than animation since the apron allows manipulation in unplanned ways, e.g., rotation in the wrong direction, to different degrees and at different speeds, thus allowing learners to explore the concept in different ways. It also allows much more interaction between the lecturer and the learners since the lecturer will have to move out from behind the podium and stand in front of the learners, bringing him spatially closer to the learners. The learners will find this to be much more interesting than “just another slide on the PowerPoint presentation,” and watching the lecturer suddenly put on an apron during class will excite their curiosity and make the lecture more interesting and memorable. The “human” model of the uterus is also highly engaging, and explains the relationship between the uterus and the peritoneum in the most intuitive way. The learners can even put on the midgut apron and the “peritoneum” themselves to appreciate the anatomical relationships depicted by them, providing kinesthetic and tactile learning as well, akin to those provided by clay models in learning anatomy (Motoike et al., 2009; Oh et al., 2009).

Judging from students’ end-of-semester comments, the use of these models and demonstration was very well received. A number of students mentioned that demonstrations and the models have really helped them in their understanding of the materials. In the case of the midgut apron, students liked it so much that the author was

honored by being photographed during the demonstration with the photos subsequently posted in Facebook.

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FIGURE LEGENDS

Figure 1. Demonstration of the midgut rotation using the midgut rotation apron.

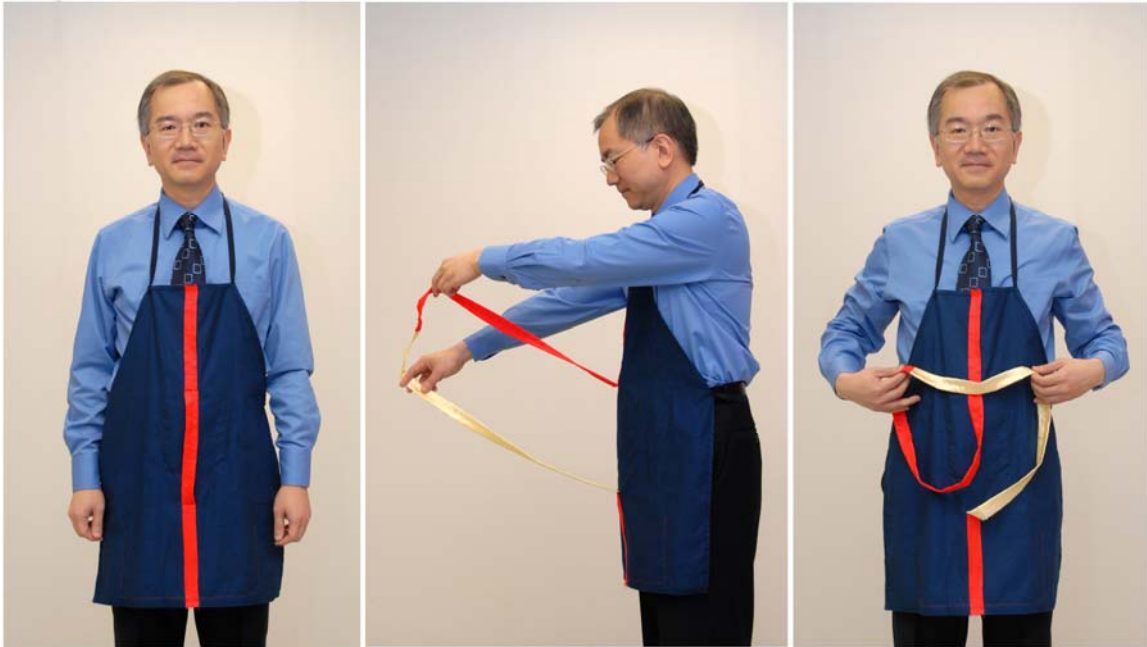


Figure 2. Demonstration of the anatomical relationship between the uterus and the peritoneum using the “human” model of uterus.

