View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by Firenze University Press: E-Journals

IJAE
Vol. 123, n. 3: 288-296, 2018
ITALIAN JOURNAL OF ANATOMY AND EMBRYOLOGY

Research Article - Education in Anatomy and Embryology

Early exposure of laparoscopic anatomy to first year medical undergraduate students: is it necessary?

Sheetal V. Pattanshetti[1], Vishwanath M. Pattanshetti[2,*]

Departments of [1]Anatomy and [2]General Surgery, J N Medical College, KAHER, Belagavi, Karnataka, India 590010

Abstract

The teaching of undergraduate anatomy is particularly based on cadaveric dissection. Currently, medical curriculum is continually evolving and focusing on clinical application, especially for first year medical undergraduate students. Recently, surgical educators defined a role for laparoscopy in teaching anatomy. This study was conducted to know the opinion by first year medical undergraduate students, of current teaching practices and which teaching modalities should be emphasized. In this study a total of 200 first-year medical undergraduate students were exposed to a Diagnostic Laparoscopy with appendectomy video, with explanation/commentary by a laparoscopic surgeon. A pre-test and a post-test questionnaire were given before and after exposure to the video. The objective of the study was to collect students' opinion by answering the questions in the questionnaire. All pre-test and post-test questionnaire results were analysed. The results were quantified in terms of percentage. The knowledge of anatomy of abdominal wall and peritoneal cavity improved from 62% to 91% of students after exposure to surgical video. Similarly, knowledge regarding laparoscopy improved from 37% to 85% and awareness about surgical video as an additional method of learning improved from 46% to 89%. Almost 93% of students were able to appreciate the organs and structures within intraperitoneal cavity. Hence, the clinicians/surgeons need to try their best and put in their maximum efforts to make the training of future medical graduates more efficient and knowledgeable in anatomy subject, by creating interest in learning of the subject by using such additional method (surgical videos) learning tool.

Key words

Medical student, anatomy education, anatomy and general surgery, laparoscopy, undergraduate medical education.

Introduction

The curriculum of medical undergraduate schools is typically divided into three distinct phases: pre-clinical, para-clinical and clinical. The exposure of students to clinical cases usually takes place at a late stage. Among all preclinical subjects anatomy is an important basic science acting as foundation for future clinical subjects. The teaching of undergraduate anatomy is particularly based on cadaveric dissection which has long been its core. The cadaveric dissection is recognized by students, educators/teachers and clinicians as the most beneficial way of learning anatomy (Fitzharris, 1998; Patel and Moxham, 2008; Arráez-Aybar et al., 2014; Davis et al., 2014; Orsbon et al., 2014). But there has been a gradual reduction in cadaveric-based

* Corresponding author. E-mail: drvmshetti@gmail.com

© 2018 Firenze University Press
http://www.fupress.com/ijae

DOI: 10.13128/IJAE-25422

teaching in recent decades, with some medical schools removing it entirely (Drake, 2002; Drake et al., 2009; Craig et al., 2010; Watmough et al., 2010; Topping, 2014; Halliday et al., 2015;).

Currently, medical curriculum is continually evolving and focusing on clinical application, especially for first year medical undergraduate students. Gross-anatomy teachers have tried many innovations to improve the clinical influence of anatomic dissection and found that clinical correlations are an effective method to achieve this goal. Preclinical subjects' thorough knowledge by students plays a key role in improving the quality of patient care and safety in their future clinical practice (Saberski et al., 2015). Early clinical exposure and experience helps medical students learn, help them develop appropriate attitudes towards their studies and future practice, and orientates medical curriculums towards society's needs (Littlewood et al., 2005).

Recently, surgical educators defined a role for laparoscopy in teaching anatomy. Live laparoscopic demonstrations augment traditional anatomic instruction by reinforcing the clinical relevance of abdominopelvic anatomy (Saberski et al., 2015). Additionally, laparoscopic demonstrations generate interest in surgery that would otherwise be absent in the preclinical years.

This study was conducted to know the opinion by first year medical undergraduate students about current teaching practices and which teaching modalities should be emphasized to improve the anatomical knowledge and learning of anatomy by medical students.

Materials and methods

This study was conducted in J N Medical College, KLE Academy of Higher Education and Research (KAHER), Belagavi, Karnataka, India. This study was reviewed and approved by the local institutional ethics committee. A total of 200 first year medical undergraduate students, who had completed their assigned cadaveric dissection of abdomen and pelvis, were included for the study. The students were exposed to a diagnostic laparoscopy with appendectomy video, with explanation/commentary by a laparoscopic surgeon. A pre-test questionnaire (Figure 1) was given to each student before exposure to the video and later a post-test questionnaire (Figure 2) was given after exposure to the video. The main purpose of showing a video of diagnostic laparoscopy with appendectomy was to sensitize and appreciate the finer aspects of intra-abdominal anatomy by each student. At a same time, the objective of the study was to collect the students' opinion by answering the questions in questionnaire, in terms of the current knowledge of abdominal anatomy, understanding the terms endoscopy and laparoscopy and appreciating additional methods of teaching and learning. All pre-test and post-test questionnaire results were analysed.

Results

The pre-test and post-test questionnaires were analysed by collecting the answer to each question. The questions and their response were grouped into the following categories.

PRE–TEST QUESTIONNAIRE (Pre-exposure to surgical video)

1) Is peritoneal cavity a potential space?
   Yes ( ) No ( ) Don't know ( )

2) Intra-abdominal organs in peritoneal cavity are
   Hollow ( ) Solid ( ) Both ( ) Don't know ( )

3) Is it possible to expand the peritoneal cavity
   Yes ( ) No ( ) Don't know ( )

4) Thinnest part of anterior abdominal wall is ----------

5) Are Endoscopy and Laparoscopy the same
   Yes ( ) No ( ) Don't know ( )

6) Were you afraid to learn gross anatomy on cadavers at the commencement of your course Yes ( ) No ( )

7) Are you interested to learn surgical anatomy in living person with blood circulating and heart beating
   Yes ( ) No ( )

8) Do you feel dissection in addition to Anatomy text books is
   Mandatory ( ) Not necessary ( ) Complimentary ( )

9) Which videos would be more helpful to learn Anatomy
   Real time surgical videos ( ) Animated videos ( )
   Not exposed to educational videos yet ( )

10) Is Anatomical knowledge necessary for clinical practice?
   Yes ( ) No ( ) Don't know ( )

Figure 1. Pre-test questionnaire.

- Pre test
  a) Knowledge regarding anatomy of abdominal wall and peritoneal cavity
  b) Knowledge regarding endoscopy/laparoscopy
  c) Awareness about additional methods of learning anatomy

POST–TEST QUESTIONNAIRE (Post exposure to surgical video)

1) Do you agree Peritoneal cavity is a potential space
   Yes ( ) No ( ) Don't know ( )
2) Do you agree peritoneal cavity can be expanded by gas
   Yes ( ) No ( ) Don't know ( )
3) The intra peritoneal organs which you saw are
   Hollow ( ) Solid ( ) Both ( )
4) Which laparoscopic surgery was demonstrated to you
   Appendectomy ( )
   Cholecystectomy ( )
   Hysterectomy ( )
   Don't know ( )
5) Organs which you could appreciate
   - Caecum Yes ( ) No ( )
   - Appendix Yes ( ) No ( )
   - Terminal ileum Yes ( ) No ( )
   - Coils of small intestine Yes ( ) No ( )
   - Tenia coli Yes ( ) No ( )
   - Ovary Yes ( ) No ( )
   - Uterus Yes ( ) No ( )
   - Fallopian tube Yes ( ) No ( )
   - Urinary bladder Yes ( ) No ( )
   - Gall bladder Yes ( ) No ( )
   - Stomach Yes ( ) No ( )
   - Liver Yes ( ) No ( )
   - Greater omentum Yes ( ) No ( )
   - Transverse colon Yes ( ) No ( )
   - Vescico uterine pouch Yes ( ) No ( )
   - Recto uterine pouch Yes ( ) No ( )
   - Pulsations of blood vessels Yes ( ) No ( )
   - Round ligament of ovary Yes ( ) No ( )
   - Falciform ligament of liver Yes ( ) No ( )
   - Deep inguinal ring Yes ( ) No ( )
   - Diaphragm Yes ( ) No ( )
   - Pericardium and beating heart Yes ( ) No ( )
6) Endoscopy means
   Intra luminal view ( ) extra luminal view ( )
7) Do you feel Real Time Surgical videos are helpful in learning Anatomy
   Yes ( ) No ( )
8) Student's view of this type of teaching module
   - Interesting ( )
   - Understanding is made easy ( )
   - This should be incorporated in lectures ( )
   - Better than only teaching anatomy on cadavers in dissection hall ( )
   - At least once should show live surgery transmission from operation theatre ( )
   - Such a teaching module will help in orienting a medical student early in his or her MBBS course to learn Gross Anatomy with more enthusiasm and sincerity, due to its valuable clinical surgical implication. In your future MBBS course
     Recommended ( ) Not recommended ( )

Figure 2. Post-test questionnaire.

- Post-test
  a) Knowledge regarding anatomy of peritoneal cavity
  b) Understanding basic principles of laparoscopy
  c) Appreciation of intraperitoneal organs and structures
  d) Appreciation of demonstration of surgical videos as additional learning method

The results were quantified in terms of percentage, before (pre-test) and after (post-test) the demonstration of surgical videos. Sixty-two per cent students had knowledge of anatomy of abdominal wall and peritoneal cavity before exposure to video, which improved to 91% after exposure to surgical video. Similarly, knowledge regarding laparoscopy improved from 37% to 85% and awareness about surgical video demonstrations by a surgeon as an additional method of learning improved from 46% to 89%. Almost 93% of students were able to appreciate the organs and structures within intraperitoneal cavity.

Discussion

The doctors/clinicians routinely encounter anatomy in their day to day clinical practice, especially the "living anatomy" (the anatomy revealed on living humans). The living anatomy is gaining attention in modern anatomy education with potential to replace cadaver-based anatomy study. The study of living anatomy in medical curricula is on the rise and with the advent of imagining technologies we can now visualize the human anatomy on living subjects. The question is raising, why fall back onto the costly, hazardous, and pungent preserved cadavers, if our medical students can study human anatomy on living subjects (Aziz et al., 2002) After all, they are going to practice medicine on living people. Thus, it appears to make much more sense to teach living anatomy, and to emphasize less on the traditional cadaveric dissection (Mclachlan and Regan De Bere, 2004).

Similarly, a sound knowledge of anatomy is essential for any surgeon and for successful surgical operation. The comprehensive knowledge of anatomy by surgeons is being updated regularly by themselves as per need in their clinical practice. So could this knowledge be utilized for teaching of anatomy to the first year MBBS students? The answer is 'yes'. The surgeon can teach living anatomy by either demonstrating exposed anatomical structures during ongoing surgery or showing a surgical video with commentary. If teaching is during ongoing surgery, the priority should be safety of the patient and procedure should be completed successfully. It is unethical to do otherwise. However, students can only learn those aspects of anatomy which happen to be demonstrated during the surgical procedure and the regional pathology which allows it.

Furthermore, many clinicians now report that levels of anatomical knowledge of junior doctors are inadequate (Cottam, 1999; Waterston and Stewart, 2005). The ongoing changes in assessment criteria have resulted in emphasis being further placed on the theoretical rather than the practical aspects of anatomy education. Therefore, insufficient anatomical training received by trainee doctors may play a role in placing patient safety at risk (Dickson et al., 2009; Roche et al., 2011). Therefore, the teaching of medical students in particular by practicing surgeons may become essential to

ensure adequate applied anatomical knowledge for safe medical practice (Peck and Skandalakis, 2004; Burgess, 2014). The motivation of surgeons for engaging in cadaveric-based teaching to medical students is related to their desire to contribute to the training of the next generation of doctors and surgeons (Burgess and Ramsey-Stewart, 2014a). This experience can have a positive influence on the motivation of medical students for learning anatomy (Burgess and Ramsey-Stewart, 2014b).

Laparoscopic surgery is a modern surgical technique and becoming gold standard technique for many abdominal procedures, in which surgery is carried out through small incisions. The fundamental element in laparoscopic surgery is the use of a laparoscope: a telescopic rod lens system that is connected to a video camera and a fiber optic cable system. The recorded surgical video can be used as an excellent resource for students to understand living anatomy. Students should immediately appreciate the difference between a living and dead organs within abdomen in terms of appearance, texture and relationship with surrounding structures. Similarly, other endoscopic procedures, such as bronchoscopy, gastroscopy, colonoscopy etc. can be great tools for normal and clinical living sessions. These are computer based audio-visual aids which are extremely useful for learning/teaching purposes.

There are few studies, where live tele-medical transmissions of surgical procedure demonstrations performed on cadaveric specimens have shown a beneficial impact on student learning and on their perceptions of surgery as a career (Hirt et al., 2010). Such approaches are further facilitated and enriched by the advent of Thiel embalming technique (based on use of an ethylene glycol and phenol solution), which has the advantage of preserving the vasculature and a life-like color, and tissue flexibility as compared to formalin-embalmed cadavers (Eisma et al., 2013; Balta et al., 2015). The advantage of this technique is that our undergraduate medical students can be exposed to demonstrations of surgical approaches on Thiel-embalmed cadavers, in order to reveal the need for detailed anatomical knowledge in future clinical postings at an early stage in their medical curriculum (Pattanshetti and Pattanshetti, 2010). Use of laparoscopy on human cadavers may also be used to complement the teaching of anatomy to medical students worldwide. This would familiarize students not only with the topography and morphology of human anatomy, but also with the concept of manipulating anatomical structures to achieve a clinical outcome. Other benefits include improved three-dimensional orientation, increased dexterity and development of team working skills among students. Magnified laparoscopic views and the ability to deeply explore anatomical features demonstrate the basic anatomy better (Gogalniceanu et al., 2008). This technique of Thiel-embalming is still not being practiced by medical schools in India. Therefore, demonstration of pre-recorded surgical video is an easy method as a teaching tool.

In this study, we have chosen those medical undergraduate students, who have completed their term of cadaveric dissection of abdomen and pelvis and theory classes on anatomy of abdomen and pelvis. Then, they were exposed to a pre-recorded operative video of diagnostic laparoscopy with appendectomy in a female patient, with commentary by a surgeon. The main outcome measures were assessed through pre- and post-session surveys. Greater than 90 per cent of students found the demonstrations were highly valuable, and students perceived a significant increase in their understanding of abdominopelvic anatomy. Additionally, almost 90 per cent of students felt demonstration of surgical videos as a best additional method of learn-

ing anatomy. Moreover, laparoscopic demonstrations generate interest in surgery that would otherwise be absent in the preclinical years.

Recently, the Medical Council of India (MCI) has proposed a Curriculum Implementation Support Program [CISP] in which stress on horizontal and vertical integration has been given. The integration should be between different disciplines (pre/para-clinical and clinical) and between hospital based medicine and community medicine. At the end it should bridge the gaps between theory and practice. Also, it has stressed on early clinical exposure. The clinical training would start in first year, with introduction of case scenarios for classroom discussion/case-based learning. There should be a coordinated effort by preclinical, para-clinical and clinical faculty for implementation of this proposal (Medical Council of India Regulations on Graduate Medical Education, 2012). Ebrahimi et al. (2012) in their study have opined that early clinical experience in parallel with theoretical courses can provide a framework for the beneficial and successful integration of the teaching and learning of basic sciences for medical students. A needs-based surgical skills curriculum can be integrated into the traditional first-year anatomy course without detracting from didactic instruction in anatomy. Furthermore, students receive early exposure to surgical mentors and skills training, which may translate into greater confidence on the wards and increased interest in surgical careers (Harras et al., 2010).

However Sheihk et al. (2016) in their study have opined that cadaver based teaching remains a cornerstone of most anatomy curricula; however, there has been a recent trend away from dissection/prosection teaching and toward plastic models and technology-based anatomy learning tools. The majority of practicing surgeons irrespective of career stage believe that cadaveric based anatomy teaching is the best method of teaching anatomy and that it should be enhanced in medical education. Furthermore, there was a strong preference for computerized tomography imaging to be integrated more into undergraduate training. In addition, developing student familiarity with imaging modalities such as ultrasound, radiography, computerized tomography and mgnetic resonance imaging has the potential to greatly improve their undergraduate appreciation of clinical anatomy, especially when considering the increasing shift towards laparoscopic surgery.

Conclusion

The students were of the opinion that this type of teaching (exposure to surgical video with explanation/commentary by a surgeon) is quite interesting and the understanding of anatomy is made easy and more effective than by conventional method. Another perception by students was that they learnt gross anatomy with more enthusiasm and sincerity. They also suggested that it should be incorporated in medical curriculum.

The Authors are of the opinion that the future of clinical practice is technology driven. Newer surgical approaches are being explored; accordingly understanding of regional/surgical anatomy will be different. Therefore it is our bound duty that students should be exposed to such newer surgical methods and imaging modalities, especially first year medical undergraduate students, which make them understand clinical application of anatomy in a better manner. In order to break monotony, the stu-

dents should be allowed to occasionally come out of dissection hall and classes to learn clinical/applied anatomy in the hospital; otherwise the clinicians/surgeons, out of their interest to teach, should come out of hospital sometimes and reach out for students.

The clinicians/ surgeons (also teachers/educators of medical colleges) need to try their best and put in their maximum efforts to make the training of future medical graduates (especially first year MBBS students) more efficient and knowledgeable in anatomy subject, by creating interest in learning the subject by using such an additional method as surgical videos as a learning tool.

References

Sheikh A.H., Barry D.S., Gutierrez H., Cryan J.F., O'Keeffe G.W. (2016) Cadaveric anatomy in the future of medical education: What is the surgeons view? Anat. Sci. Educ. 9: 203-208.

Arráez-Aybar L.A., Bueno-López J.L., Moxham B.J. (2014) Anatomists' views on human body dissection and donation: An international survey. Ann. Anat. 196: 376-386.

Aziz M.A., McKenzie J.C., Wilson J.S., Cowie R.J., Ayeni S.A.. Dunn B.K. (2002) The human cadaver in the age of biomedical informatics. Anat. Rec. 269: 20-32.

Balta J.Y., Lamb C., Soames R.W. (2015) A pilot study comparing the use of Thiel- and formalin-embalmed cadavers in the teaching of human anatomy. Anat. Sci. Educ. 8: 86-91.

Burgess A. (2014) Anatomy by whole-body dissection: What motivates surgeons to teach? ANZ J. Surg. 84: 803-804.

Burgess A., Ramsey-Stewart G. (2014a) What motivates surgeons to teach dissection anatomy to medical students and surgical trainees? Adv. Med. Educ. Pract. 6: 11-16.

Burgess A., Ramsey-Stewart G. (2014b) Elective anatomy by whole body dissection course: What motivates students? BMC Med. Educ. 14: 272.

Cottam W.W. (1999) Adequacy of medical school gross anatomy education as perceived by certain postgraduate residency programs and anatomy course directors. Clin. Anat. 12: 55-65.

Craig S., Tait N., Boers D., McAndrew D. (2010) Review of anatomy education in Australian and New Zealand medical schools. ANZ J. Surg. 80: 212-216.

Davis C.R., Bates A.S., Ellis H., Roberts A.M. (2014) Human anatomy: Let the students tell us how to teach. Anat. Sci. Educ. 7: 262-272.

Dickson J.K., Morris G., Heron M. (2009) The importance of hand anatomy in the accident and emergency department: Assessment of hand anatomy knowledge in doctors in training. J. Hand Surg. Eur. 34: 682-684.

Drake R.L. (2002) Meeting the challenge: The future of the anatomical sciences in medical school curricula. Anat. Rec. 269: 68.

Drake R.L., McBride J.M., Lachman N., Pawlina W. (2009) Medical education in the anatomical sciences: The winds of change continue to blow. Anat. Sci. Educ. 2: 253-259.

Eisma R., Lamb C., Soames R.W. (2013) From formalin to Thiel embalming: What changes? One anatomy department's experiences. Clin. Anat. 26: 564-571.

Fitzharris T.P. (1998) Survey of gross anatomy courses in the United States and Canada. Anat. Rec. 253: 162-166.

Gogalniceanu P., Madani H., Paraskeva P.A., Darzi A. (2008) A minimally invasive approach to undergraduate anatomy teaching. Anat. Sci. Educ. 1: 46-47.

Halliday N., O'Donoghue D., Klump K.E., Thompson B. (2015) Human structure in six and one-half weeks: One approach to providing foundational anatomical competency in an era of compressed medical school anatomy curricula. Anat. Sci. Educ. 8: 149-157.

Zaid H., Ward D., Sammann A., Tendick F., Topp K.S., Maa J. (2010) Integrating surgical skills education into the anatomy laboratory. J. Surg. Res. 158: 36-42.

Hirt B., Shiozawa T., Herlan S., Wagner H.J., K€uppers E. (2010) Surgical prosection in a traditional anatomical curriculum - Tübingens' Sectio chirurgica. Ann. Anat. 192: 349-154.

Littlewood S., Ypinazar V., Margolis S.A., Scherpbier A., Spencer J., Dornan T. (2005) Early practical experience and the social responsiveness of clinical education: Systematic review. Brit Med J. 331: 387-391.

McLachlan J.C., Regan De Bere S. (2004) How we teach anatomy without cadavers, Clin. Teacher 1(2): 49-52.

Medical Council of India Regulations on Graduate Medical Education (2012) Available at: http://www.mciindia.org/Rules-and-Regulation/GME_REGULATIONS.pdf, accessed May 1, 2017.

Orsbon C.P., Kaiser R.S., Ross C.F. (2014) Physician opinions about an anatomy core curriculum: A case for medical imaging and vertical integration. Anat. Sci. Educ. 7: 251-261.

Patel K.M., Moxham B.J. (2008) The relationships between learning outcomes and methods of teaching anatomy as perceived by professional anatomists. Clin. Anat. 21: 182-189.

Pattanshetti V.M., Pattanshetti S.V. (2010) Laparoscopic surgery on cadavers: a novel teaching tool for surgical residents. ANZ J. Surg. 80: 676-680

Peck D., Skandalakis J.E. (2004) The anatomy of teaching and the teaching of anatomy. Am. Surg. 70: 366-368.

Roche A., Williams G., Wharton D., Brown D.. (2011) Physical and radiographic identification of the bones of the wrist by junior doctors. J. Hand Surg. Eur. 36: 107-110.

Saberski E.R., Orenstein S.B., Matheson D., Novitsky Y.W. (2015) Real-time cadaveric laparoscopy and laparoscopic video demonstrations in gross anatomy: an observation of impact on learning and career choice. Am. Surg. 81: 96-100.

Ebrahimi S., Kojuri J., Ashkani Esfahani S. (2012) Early clinical experience, a way for Preparing Students for clinical setting. Galen Med. J. 1: 42-47.

Topping D.B. (2014) Gross anatomy videos: Student satisfaction, usage, and effect on student performance in a condensed curriculum. Anat. Sci. Educ. 7: 273 279.

Waterston S.W., Stewart I.J. (2005) Survey of clinicians' attitudes to the anatomical teaching and knowledge of medical students. Clin. Anat. 18: 380-384.

Watmough S.D., O'Sullivan H., Taylor D.C. (2010) Graduates from a reformed undergraduate medical curriculum based on Tomorrow's Doctors evaluate the effectiveness of their curriculum 6 years after graduation through interviews. BMC Med. Educ. 10: 65 (8 pages).