

Medical Students' vs. Consultant Surgeons' View of Anatomy Knowledge

Opinión de los Estudiantes de Medicina vs. Cirujanos
Consultores sobre el Conocimiento de la Anatomía

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SUMMARY: Anatomy is considered the core of surgery. Surgeons often complain about deficiencies in their junior doctor's level of knowledge in anatomy. The study aim was to compare opinions of final year medical students and consultant surgeons regarding current methods of teaching anatomy and which methods should be utilized to enhance medical student's anatomy knowledge. Two questionnaires were developed: one for consultant surgeons and the other one was for medical students. These questionnaires surveyed consultant surgeons and senior medical students regarding their views on various aspects of undergraduate anatomy teaching including: increasing time for anatomy teaching, anatomy knowledge level, surgeons participation in teaching, best methods of teaching and examination of anatomy, areas of strength and weakness among students, and adequacy of current teaching to understand radiology images, laparoscopic and endoscopic views. The response rate for consultants and students was 62.6 %. Surgeons who encouraged increasing the time for undergraduate anatomy teaching were 77.1 %. A significant percentage of surgeons and students thought that their junior surgeons / student level of anatomical knowledge was poor (63.4 % and 46.6 % respectively). Additionally, over two thirds of surgeons and students thought that surgeons participation in anatomy teaching in the first 3 years in medical schools may be useful (68.0 % and 69.0 % respectively). Cadaveric teaching was selected as best method of anatomy teaching by 81.0 % surgeons and 79.6 % students. Only 33.1 % surgeons and 35.4 % student thought that our current anatomy teaching was adequate to understand radiologic, laparoscopic and endoscopic views. Surgeons and students were in agreement regarding students' reduced levels of anatomy knowledge. One particular aspect of such deprivation was students' inability to interpret radiological pictures, laparoscopic and endoscopic views. Increasing time dedicated for anatomy teaching, involving surgeons in the process of anatomy teaching and redirecting the focus on cadaveric dissection may be beneficial.

KEY WORDS: Gross anatomy education; Medical education; Surgical teaching; Surgeon's perception of teaching; Student's perception of teaching.

INTRODUCTION

Undergraduate anatomy education is prerequisite for syllabus accreditation of basic medical education by World Health Organization and World Federation For Medical Education. Anatomy is usually taught in the first 3 years of the medical program.

Cadaveric anatomy teaching is considered the standard of gross anatomy education (Sheikh *et al.*, 2016). In recent years, there has been decline in the number of anatomy demonstrators in the face of rising number of medical students (Miller & Neal, 1994). Rowland *et al.* (2011) reported that medical students before 2005 were routinely

assessed in anatomy via practical and oral exams, compared to more written exams such as MCQ and extended matching questions for students after 2005. This noticeable change in the methods of assessing medical student's anatomy knowledge led students to change their studying strategies relying more on theory and ignoring the practical aspects (Rowland *et al.*). In addition, defects in anatomy training was associated with a significant number of medico-legal litigation, and placed patient's safety at unnecessary increased risk (Goodwin, 2000). Consequently, many physician complained about poor anatomy knowledge of junior doctors (Waterston & Stewart, 2005).

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Furthermore, Clinical judgment is directly proportional to medical experience. Clinical judgment may be enhanced by teaching clinically oriented basic medical sciences and in particular; gross anatomy (Meral Savran *et al.*, 2015).

There is substantial consistency in the literature supporting the continued use of cadaveric gross anatomy teaching when medical students or anatomy demonstrators' opinions were gauged. However, there is lack of such evidence when it comes to surgeons views (Orsbon *et al.*, 2014). The aim of this study was to compare opinions of final year medical students and consultant surgeons regarding current methods of teaching anatomy and which methods should be utilized to enhance medical students' anatomical knowledge.

MATERIAL AND METHOD

Questionnaire Development: This multi-center survey was reviewed and approved by the university Research and Development committee. Two questionnaires were developed following a comprehensive review of literature. The questionnaires' items were chosen after discussion with senior medical colleagues and educationalists.

The consultant's questionnaire consisted of two sections; the first section collected demographic data, and the second section composed of eight questions related to anatomy teaching. Four of these questions were created using an 8-item Likert scale so as to enforce an answer and avoid neutral answer. One question was check box question to allow respondents to select multiple answers. The remainder three questions were open-ended questions.

The student's questionnaire consisted of two sections; the first section collected demographic data, and the second section composed of ten questions related to anatomy teaching. Three questions were created using an 8-item liker scale so as to enforce an answer and avoid neutral answer. Four questions were check box questions to allow respondents to select multiple answers. Two questions were yes / no question. The last question was an open-ended question.

The two questionnaires were created taking into consideration the importance of protecting respondents' confidentiality.

Questionnaire Distribution: A pilot survey was sent to five consultant surgeons and ten medical students. Minor adjustment were made to make the questionnaires easier to read and complete. Questionnaires were then distributed

electronically to eligible consultants and medical students via Google Forms.

From May to August 2018, a total of 200 consultant surgeons and 500 medical students were contacted to complete their questionnaires. Consultant surgeons included in the study were surgeons with a minimal 2 yr experience post board certification and they were working in university teaching hospitals or university-affiliated hospitals with recognized residency program in surgery. Medical students included in this study were either 6th year medical students or newly graduated students doing their internship year and they were Jordanian universities undergraduates.

Data Analysis: Data were collated and stored into Excel Datasheets version 2007. Statistical analysis was performed using Statistical Package for Social Scientists (SPSS) version 17.

Participants' responses to each item of the 8-item Likert scale were graded to 0-7. The item scores were then standardized to a range of 0 to 100 %; e.g. score 0 was standardized into 0 %, score 7 was standardized into 100 %, etc. (Tayyem *et al.*, 2014).

Independent-samples t-test was used to compare the scores of two different (independent) groups of people (e.g. consultants and students) and evaluated the likelihood that an observed difference between data was due to chance. Pearson's chi squared tests were used to assess categorical data sets. Data difference was considered to be statistically significant when its P value was ≤ 0.05 .

RESULTS

Demographic data. One hundred and fifty three consultant surgeons (76.5 %) and 313 medical students (62.6 %) responded to the questionnaire. The majority of consultant surgeons were males (96.7 %). General surgeons were top respondents (40.5 %), followed by urologist (9.8 %) and orthopedic surgeons (9.8 %). Almost third of respondent surgeons (36.6 %) worked at the Hashemite University.

Less than third of respondent medical students were males (32.3 %). The majority of students were 6th year students (80.2 %). Over half of students (54.0 %) studied at the Hashemite University.

Respondents' perception of anatomy teaching: One hundred and eighteen (77.1 %) surgeons encouraged increasing the time for anatomy teaching for the undergraduate medical students.

Table I. Consultant vs. student views on anatomy teaching.

	Consultants	Students	P value
Respondents who thought that level of anatomical knowledge was poor	97 (63.4%)	146 (46.6%)	0.06
Score of Level of anatomical knowledge	50	42.5	0.08
Respondents who thought that surgeons participation in anatomy teaching was useful	104 (68.0%)	216 (69.0%)	0.45
Score of Usefulness of surgeons participation in anatomy teaching	65	65.3	0.95
Respondents who thought that current classic anatomy teaching is adequate to understand radiology images, laparoscopic views and endoscopic views	51 (33.1%)	111 (35.4%)	0.11
Score of Adequacy score of classic anatomy teaching to understand radiology images, laparoscopic views and endoscopic views	38.3	41.1	0.23

Ninety seven (63.4 %) surgeons thought that their junior surgeons' level of anatomical knowledge was poor. Similarly, 146 (46.6 %) students felt that their level of anatomy Knowledge was poor. Table I shows that the level of anatomical knowledge score was low for both surgeons and students (50 vs. 42.5, P 0.08).

One hundred and four (68.0 %) surgeons thought that surgeon's participation in anatomy teaching in the first 3 years in medical schools may be useful or helps to improve anatomy teaching. Student's answers were parallel to the surgeon's answers as 216 (69.0 %) students have similar thoughts. Both surgeons and students scored similarly as shown in Table I (65.0 vs. 65.3, P 0.95).

Only 51 surgeons (33.1 %) and 111 students (35.4 %) thought that the current classic anatomy teaching was adequate to understand radiology images, laparoscopic views and endoscopic views. Table I illustrates comparable results among surgeons and students when calculating the score of adequacy of classic anatomy teaching to understand radiology images, laparoscopic views and endoscopic views (38.3 vs. 41.1, P 0.23).

Table II shows the best methods for teaching anatomy as viewed by respondents. Cadaveric teaching was the most

Table II. Best methods for teaching anatomy as selected by respondents.

Method	Consultant	Student	P value
Cadaveric teaching (%)	124 (81.0 %)	249 (79.6 %)	0.81
Multimedia	95 (62.1 %)	237 (75.7 %)	0.00
Lectures	48 (31.4 %)	92 (29.4 %)	0.67

Table III. Best methods for assessing anatomy knowledge as selected by students.

Method	Current	Preferred	P value
MCQ (%)	301 (96.2 %)	115 (36.7 %)	0.00
Cadaveric teaching (%)	152 (48.6 %)	201 (64.2 %)	0.00
Computer based	49 (15.7 %)	86 (26.8 %)	0.00

frequent method selected by respondent surgeons (81.0 %) followed by multimedia (62.0 %). Similar students response was noticed with cadaveric teaching being most commonly selected method (79.6 %) followed by multimedia (75.7 %). Contrary to student's preference, 288 (92.0 %) students were taught anatomy by means of lectures and only 99 (31.6 %) students enjoyed teaching via multimedia.

Students were most commonly examined in anatomy via MCQ (96.2 %) followed by on cadaver exam (48.6 %) as shown in Table III. However, their most common preferred method for examination was on cadaver exam (64.2 %). Only 36.7 % of students would choose MCQ as a method to be examined in anatomy.

One hundred and eight six (59.5 %) surgeons noticed that students have adequate and good knowledge of the abdominal anatomy. The most common weak area in anatomy detected by surgeon was Central Nervous System (22.2 %). 45 (29.4 %) surgeons comments on how to improve anatomy teaching were concentrated on providing more cadaveric and clinically applied teaching. Only 70 (22.4 %) students mentioned that they were taught anatomy by surgeons in the first 3 years in the medical school.

Only 26 students (8.3 %) expressed their intent to pursuit a career in anatomy. When students were asked to write down general comments on how to improve anatomy teaching, 220 (70.3 %) students left the question blank. The remainder of students' comments were roughly distributed among on cadaver teaching, multimedia and clinically oriented teaching.

DISCUSSION

This multi-center study surveyed views of consultant surgeons and senior medical students regarding various aspects of undergraduate anatomy

teaching including: increasing time for anatomy teaching, anatomy knowledge level of junior surgeons / students , surgeons participation in teaching, best methods of teaching and examination of anatomy, areas of strength and weakness among students, and adequacy of current teaching to understand radiology images, laparoscopic and endoscopic views.

Over two thirds of respondent surgeons (63.4 %) and a almost half of students (46.6 %) thought that anatomy knowledge level for junior surgeons and students was poor. Therefore, it was not a surprise to find out that most surgeons encouraged increasing time for undergraduate anatomy teaching (77.1 %). Similar calls for extending the anatomy teaching beyond the first 3 year of medical program has been heard over the last few years (Older, 2004; Purkayastha *et al.*, 2007; Stranding, 2009).

This study evaluated students opinion regarding being taught anatomy by surgeons. Less than quarter of respondent students were taught anatomy by surgeons. Additionally, there was almost an identical agreement between surgeons (68.0 %) and students (69.0 %) on the usefulness of participation of surgeons in undergraduate anatomy teaching. Participation of surgeons in the process of anatomy education could ensure better anatomy teaching and improve patient safety outcome (Burgess & Ramsey-Stewart, 2014).

A number of studies highlighted the reduction of time dedicated for undergraduate anatomy teaching (Drake *et al.*, 2009; Craig *et al.*, 2010; Cho & Hwang, 2013). Consequently, there has been reduction in cadaveric dissection time which may reflect negatively on the knowledge base of junior surgeons and potentially endanger patients safety. Ahmed *et al.* (2011)

This study assessed surgeons and students satisfaction from current methods in teaching anatomy. The majority of surgeons (81.0 %) and students (79.6 %) indicated that the best method of teaching anatomy was cadaveric dissection. The most preferred method for examination as selected by students was on cadaver exam (64.2 %). These results were echoed in previous studies (Snelling *et al.*, 2003 Inwood & Ahmad, 2005; Rizzolo & Stewart, 2006; Kerby *et al.*, 2011). Furthermore, the most common comments of respondent surgeon on how to improve anatomy teaching were concentrated on providing more cadaveric and clinically applied teaching (29.4 %). Several comments from surgeons and students indicated their wish to extend anatomy teaching for the full length of the medical curriculum.

This study examined the relationship between our current methods of anatomy teaching and students ability of interpreting radiological pictures, laparoscopic and

endoscopic views. Only third of respondent surgeons (33.1 %) thought that current classic anatomy teaching is adequate to understand these images. Similar disappointing results were noticed among student answers (35.4 %). Students' failure to utilize their anatomy knowledge in identifying radiological images has been recognized in prior studies. Roche *et al.* (2011) and Ahmed *et al.* found that over quarter of their study participants suggested the introduction of laparoscopic views in the first two years of medical curriculum (Ahmed *et al.*). In the era of laparoscopic, robotic and endoscopic surgery, integrating radiological images such as CT scan, MRI and USS in gross anatomy classes has the potential of improving the undergraduate anatomy knowledge and tighten the relationship between what students learn in class with the concurrent technological advancement in surgery (Bohl *et al.*, 2011; Kodera *et al.*, 2015).

A minority of the students expressed their intent to pursuit a career in anatomy, which has been noticed in other studies (Onakpoya *et al.*, 2009).

Study limitation: This survey was carried on a relatively small sample size (153 consultants and 313 students). Additionally, the study included mainly consultant general surgeons (40.5 %) which may have skewed the results. Future studies may consider increasing the sample size with equal representation from the various surgical specialties.

CONCLUSION

This study showed general dissatisfaction of both surgeons and students from student anatomy knowledge level. Student poor knowledge could be attributed to a number of factors such as reduction of anatomy time teaching, change of methods of delivering anatomy teaching; mainly reduction of time students exposed to cadaveric dissection, and reduction of ratio of teachers to students. The study suggested that increasing the time of anatomy teaching and vertically extending anatomy teaching to all years of study rather than limiting it to first 3 years might help improving deficits in anatomy knowledge. In addition, involving more surgeon in anatomy teaching may help delivering more clinically oriented anatomy. For example, surgeons may be more capable of linking laparoscopic views, endoscopic views and radiological images to clinical scenarios during an anatomy class, which could aid the process of anatomy learning. Finally, these recommendations may help in producing more anatomically educated junior surgeons with much safer practicing approaches and techniques.

TAYYEM, R.; QANDEEL, H.; QSOUS, G.; FATAF TAH, J.; BADRAN, D. & BANI HANI, K. Opinión de los estudiantes de medicina vs. cirujanos consultores sobre el conocimiento de la anatomía. *Int. J. Morphol.*, 37(4):1475-1479, 2019.

RESUMEN: La anatomía es considerada la base de la cirugía. Los cirujanos a menudo se quejan de las deficiencias en el nivel de conocimiento anatómico de su médico subalterno. El objetivo del estudio fue comparar las opiniones de los estudiantes de medicina y los cirujanos consultores del último año con respecto a los métodos actuales de enseñanza de anatomía y los métodos que deben utilizarse para mejorar el conocimiento de la disciplina de los estudiantes de medicina. Se desarrollaron dos cuestionarios: uno para cirujanos consultores y otro para estudiantes de medicina. Estos cuestionarios encuestaron a cirujanos consultores y estudiantes de medicina de alto nivel con respecto a sus puntos de vista sobre diversos aspectos de la enseñanza de anatomía de pregrado, que incluyen: aumentar el tiempo para la enseñanza de anatomía, el nivel de conocimiento de anatomía, la participación de los cirujanos en la enseñanza, los mejores métodos de enseñanza y el examen de anatomía, áreas de fortaleza y debilidad entre los estudiantes, y la adecuación de la enseñanza actual para comprender imágenes de radiología, vistas laparoscópicas y endoscópicas. La tasa de respuesta de consultores y estudiantes fue del 62,6 %. Los cirujanos que señalaron aumentar el tiempo para la enseñanza de anatomía de pregrado fue en el 77,1 %. Un porcentaje significativo de cirujanos y estudiantes consideraron que su nivel de conocimiento anatómico entre cirujanos subalternos y estudiantes era bajo (63,4 % y 46,6 %, respectivamente). Además, más de dos tercios de los cirujanos y estudiantes estimaron que la participación de los cirujanos en la enseñanza de anatomía en los primeros 3 años en las escuelas de medicina puede ser útil (68,0 % y 69,0 %, respectivamente). La enseñanza en el cadáver fue seleccionada como el mejor método de enseñanza de anatomía por 81,0 % de cirujanos y 79,6 % de estudiantes. Sólo el 33,1 % de los cirujanos y el 35,4 % de los estudiantes pensaron que nuestra enseñanza actual de anatomía era adecuada para entender las vistas radiológicas, laparoscópicas y endoscópicas. Los cirujanos y los estudiantes estuvieron de acuerdo con respecto a los reducidos niveles de conocimiento anatómico de los estudiantes. Un aspecto particular de tal privación fue la incapacidad de los estudiantes para interpretar imágenes radiológicas, vistas laparoscópicas y endoscópicas. Puede ser beneficioso aumentar el tiempo dedicado a la enseñanza de la anatomía, involucrando a cirujanos en el proceso de enseñanza de la anatomía y redirigiendo el enfoque a la disección del cadáver.

PALABRAS CLAVE: Educación en anatomía general; Educación médica; Enseñanza quirúrgica; Percepción del cirujano sobre la enseñanza; Percepción del estudiante sobre la enseñanza.

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