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Original Article

Determining trainees' knowledge of surgical anatomy: A specialist's perspective

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الملخص

أهداف البحث: إن معرفة الأجزاء التشريحية أثناء العمليات الجراحية يؤدي إلى تقليل المضاعفات، ومن هنا كان الهدف الرئيس للدراسة هو معرفة الأجزاء التشريحية التي يعتبرها أطباء الاختصاص مهمة؛ ويجب أن يكون المقيم المتدرب في مستوى السنة الثالثة قادرا على تحديدها أثناء العمليات الجراحية. بالإضافة إلى ذلك قمنا بدراسة العوامل التي قد تؤثر على آراء الأطباء الاختصاصيين.

طرق البحث: شملت الدراسة أطباء اختصاصيين في التوليد والجراحة النسائية، الذين يعملون في مستشفيات يوجد فيها برامج تدريب للأطباء المقيمين وذلك في الفترة ما بين ٢٠١٩/٢/١ و٢٠١٩/١٠/٣٠. وطُلب من أطباء الاختصاص تقييم أهمية الأجزاء التشريحية التي يجب أن يكون المقيم المتدرب في السنة الثالثة قادرا على معرفتها أثناء العمليات الجراحية. ثم تم تحليل الاستجابات بناء على عمر الطبيب الاختصاصي وجنسه ونوع الممارسة إذا كانت في مستشفى عام أو خاص وعدد سنوات الخبرة وعبء العمل الجراحي.

النتائج: استجاب للدراسة ١٦٥ اختصاصيا، وذلك بمعدل استجابة ٦٩.٣٪. وكان متوسط العمر ٤٦.١ سنة، ومتوسط عدد سنوات الخبرة ١٣.٤. بالإضافة إلى ذلك؛ صنف ٨٦.٦٪ من الاختصاصيين جميع الأجزاء على أنها "أكثر أهمية". لم تكن الأهمية حسب تصنيف االاختصاصيين مرتبطة بالجنس أو عدد سنوات الخبرة أو عبء العمل الجراحي. كما تم تصنيف أهمية ٦٣٪ من الأجزاء التشريحية "أعلى" من قبل الاختصاصيين المبتدئين مقارنة بالاختصاصيين الأكثر خبرة.

الاستنتاجات: المعرفة بالتشريح الجراحي مهمة للتدريب في برامج الإقامة في التوليد والجراحة النسائية. إن تصور الاختصاصيين لأهمية الأجزاء التشريحية المختلفة يعكس فهمهم لمتطلبات التدريب. سلطت نتائجنا الضوء على الأجزاء التشريحية المهمة التي من المتوقع أن يعرفها الأطباء المقيمون في السنة الثالثة من التدريب أثناء العمليات الجراحية. قد يؤسس هذا البحث مدخلا لبحوث مستقبلية تشمل جميع سنوات التدريب وتعمل على تشكيل مرجعا لماهية المعرفة التشريحية المطلوبة لكل سنة تدريب.

الكلمات المفتاحية: التشريح؛ التشريح الجراحي؛ الأجزاء التشريحية؛ المقيمون في التوليد والجراحة النسائية؛ المتخصصين

Abstract

Objectives: Intraoperative identification of anatomical structures can potentially reduce the risk of surgical complications. This study aims to report specialists' perspectives about the anatomical structures that third-year residents should be able to identify during surgical operations. In addition, the factors which may influence specialists' opinions are discussed.

Materials and methods: This qualitative cross-sectional study was conducted on obstetricians and gynaecologists between 1/2/2019 and 30/10/2019. The specialists practising in a hospital with a residency programme were included, and were asked to rate the importance of structures that a third-year resident should be able to identify during operations. We performed a comparison

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of responses based on specialists' age, gender, practice type, years of experience, and surgical workload.

Results: One hundred and sixty-five specialists were recruited with a response rate of 69.3%. The mean age of respondents was 46.1 years, and they had a mean experience of 13.4 years. Furthermore, 86.6% of specialists rated all the anatomical structures as "more important". The importance of surgical structures, as rated by specialists, was not related to gender, years of experience, or surgical workload. The importance of 63% of the anatomical structures was rated higher by junior specialists than senior specialists.

Conclusion: Knowledge of anatomical structures is vital for gynaecologic residency training. Specialist's perceptions of the importance of various anatomical structures reflect their understanding of the training requirements. Our results highlighted the important anatomical structures that third-year residents are expected to identify during surgical operations. Future research may establish a reference for the core anatomy knowledge essential for each training year.

Keywords: Anatomical structures; Anatomy; Residents in obstetrics and gynaecology; Specialists; Surgical anatomy

Introduction

Gross anatomy teaching is considered a fundamental part of medical education. While some doctors suggest that it should be taught by anatomists,[1] others believe that it should be an applied subject and should be taught by surgeons.[2] No matter how the subject of anatomy is perceived, it is considered one of the major components of undergraduate medical education, where adequate knowledge remains important for safe clinical practice.[3] While cadaver dissection remains the core teaching method, recent advances in imaging technologies such as ultrasound scan, computerised tomography, and magnetic resonance imaging are used in the study of both living and dead bodies.[4]

Recently, there has been a decline in undergraduate anatomy knowledge, which is probably related to a reduction in anatomy teaching staff and changes in the curricula.[5] This decline may have an impact on the safety of clinical practice. In addition, the teaching of anatomy is perceived differently by medical students, clinicians, and anatomists. Sbayeh et al.,[6] showed that compared to students and anatomists, clinicians were more in favour of teaching anatomy as an applied science. Furthermore, the importance of anatomy was perceived differently by different specialities, with surgical specialities considering it more important than medical specialities.[7]

Sgroi et al.,[8] reported how resident doctors in obstetrics and gynaecology (O&G) perceive their surgical anatomy knowledge. Their results showed that while 11% of first year residents considered their surgical anatomy knowledge as adequate, 77% of final year residents reported sufficient knowledge, and 84% described limitations in their anatomy knowledge. Another report from the United States involving first year gynaecology oncology fellows showed that 40% of participants could not identify relevant anatomical structures and tissue planes.[9] These findings are important as fellowship training starts after the completion of five years residency programme.

Specialists in O&G are expected to identify the important anatomical structures relevant to O&G that medical students and resident doctors should know and be able to identify at the different stages of their training. Zumwalt[10] reported the opinions of specialist gynaecologists regarding the importance of relevant anatomy to medical students before they start clinical training. The results showed that most specialists emphasised the importance of the positions of pelvic structures and their blood supply, the pelvic floor, the layers of the uterus, the relevant anatomical locations of the ureters and the branches of the internal iliac artery.

There are no published reports about the perception of specialists on what constitutes important anatomical structures that resident doctors should be able to identify during surgical operations at the different stages of their training.

The main aim of our report is to study the abdominal and pelvic anatomical structures that are considered important by specialists that a third-year resident doctor should be able to identify during surgical operations. In addition, we aim to examine factors that may influence the specialists' opinions on the importance of the anatomical structures, these factors including specialists' age, gender, years of experience, type of practice, either public or private, and their average workload in different common O&G surgical procedures.

Materials and Methods

This was a questionnaire-based, qualitative, cross-sectional study involving currently practising specialists. The study took place between 1/2/2019 and 30/10/2019. Forty anatomical structures and landmarks were identified by the researchers as relevant to O&G. The questionnaire was designed by the researchers. Face validity was established by a group of specialists' O&G who have at least ten years of experience. Inclusion criteria required the specialist to be currently practising in a hospital with a residency programme. Data collected included age, gender, years of experience, type of practice; public or private, and average number of common surgical procedures performed every year either in person or as supervising residents. In addition, recruited specialists were asked to rate the importance of the anatomical structures on a five-point Likert scale. For the purpose of this study, the "importance" was defined based on the possibility that a complication is more likely to occur if a third-year resident doctor is not able to identify the anatomical structure while operating. They were asked to rate if the anatomical structure is "not important, slightly important, moderately important, important and very important". The study questionnaire was distributed to

various hospitals with residency programmes in O&G. Participation in the study was voluntary and anonymity was guaranteed. In addition, the study was left open for four weeks. Furthermore, a reminder was sent to the chairpersons of the various departments two weeks after the start of the study to encourage specialists to participate.

The rationale for choosing third year resident doctors as a reference group is that O&G residency programme in Jordan is five years. A third-year resident doctor is halfway through the training programme and is expected to have gained reasonable surgical anatomy knowledge. If important structures are defined at this stage, we may be able to establish not only an evaluation instrument but also an improvement plan for the remaining period of the training.

Sample size calculation

Training programmes in O&G are available in all public and five private hospitals. In defining our study population, all specialists in the public sectors were considered as part of the study population. Furthermore, of the specialists in the private sector, we included all faculty members of the training programmes, and specialists who have admission and operating privileges to these hospitals.

At the time of the study, formal information about the numbers of specialists was obtained from relevant training programme directors. The number was 238 specialists, 161 and 77 in the public and private sectors, respectively. For a confidence level of 95% and confidence interval of 5, the sample size was calculated to be 154.

Statistical analysis

Descriptive statistics were calculated using mean and standard deviation for normally distributed, continuous variables; median and interquartile range for non-normally distributed, continuous variables; and frequency and percentage for count data.

To evaluate the specialists' ratings of the importance of the anatomical structures, a total questionnaire scores out of a possible 200 was calculated for each respondent by summing the responses on the questionnaire. For this calculation, the five-point Likert scale items "not important, slightly important, moderately important, important and very important" were given the corresponding values of 1.2.3.4 and 5. In addition, the mean number and percentage for each Likert scale response were calculated. For the purpose of this study, the responses of the specialists regarding the importance of the anatomical structures were further grouped into the "Less important" group that included all the responses which were rated either not important or slightly important, and the "More important group" which included all the responses that were either important or very important. Comparisons between specialists' responses based on gender and type of practice were performed using independent samples t-test. Correlation between responses and number of post-board years of experience was conducted using Pearson Product Moment Correlation.

Specialists were further grouped into two groups to compare the responses of specialists based on the average number of common O&G surgical procedures they perform every year; the first group which included specialists who perform the procedures "More often," and the second which included specialists who perform the procedures "Less often." The cut off score between these two groups was the mean (for normally distributed data) or the median (for non-normally distributed data) of the number of surgical procedures performed every year. Comparisons between total responses were performed using independent-samples t-test and comparisons between responses to individual anatomical structures were conducted using Mann–Whitney U test.

Level of significance was set at $\alpha < 0.05$. Multiple imputations were used to estimate missing responses on the questionnaire. Data were analysed using SPSS for Windows (Version 22, SPSS Inc., Chicago, Illinois).

Results

General

One hundred and sixty-five specialists responded to the questionnaire. The response rate was 69.3%. The mean age (SD) was 46.1 (±10.3) years, and the mean (SD) years of experience after board certification was 13.4 (±9.8). While 80 (48.5%) of the specialists had less than ten years' experience after certification, 85 (51.5%) had more than ten years. Furthermore, 95 (57.6%) of the respondents were females, and 70 (42.4%) were males. Table 1 shows the demographics and the mean (SD) of the common surgical procedures performed by specialists every year.

The importance of the anatomical structures

The results show that the mean number and percentage of the specialists who considered all the anatomical structures as "More important" was 141.9 (86.6%). In addition, the mean number and percentage of the specialists who rated almost all of the structures as "Less important" was 2.5

Table 1: Specialists' demographics and workload in different common surgical procedures.

Demographics	
Age[a]	46.1 (10.3)
Gender (females vs. males)[c]	95 (57.6) vs. 70 (42.4)
Years of experience[a]	13.4 (9.8)
Place of work (public vs. private sectors)[c]	109 (66.1) vs. 56 (33.9)
Surgical procedures performed every year	
Caesarean section[b]	100 (50–75) [2–500]
Ovarian cystectomy/oophorectomy[a]	13.5 (9.8) [1–45]
Salpingectomy[a]	38.2 (21.5) [0–90]
Abdominal hysterectomy[b]	20 (10–38) [0–150]
Vaginal hysterectomy[b]	10 (5–20) [0–100]
Pelvic floor repair[b]	20 (5–45) [0–150]
Minimal access procedure[b]	2 (0–5) [0–55]
Sub-urethral tapes (TVT/TOT)[b]	10 (1–20) [0–200]
Repair of perineal tears[a]	15.3 (12.8) [0–55]
Vaginal vault repair/hysteropexy[b]	0 (0–2) [0–100]

[a] Mean (standard deviation) [range].
[b] Median (interquartile range) [range].
[c] Number (percentage).

(3.5%). Table 2 shows the numbers and percentages of the specialists rating of all anatomical structures.

Table 3 shows the structures that were considered "More important" by at least 90% of specialists. The structures that were considered "Less important" by at least 5% of specialists are shown in Table 4.

When the anatomical structures were anatomically regrouped either as organ systems or anatomical areas, the results show that the reproductive tract structures (uterus, ovaries, and tubes), the mesosalpinx and Infundibulopelvic ligament were considered "More important" by 96.3% of the specialists. In addition to the urinary bladder, none of these structures was considered "Less important" by any specialist.

The anatomical structures that were considered "More important" by the least number of specialists were the superficial and deep circumflex iliac vessels (63.1% and 63.2%, respectively) and the presacral space (64.4%). Furthermore, the structures that were considered "Less important" by the largest number of specialists were the deep circumflex iliac vessels (11%), the ascending colon (9.8%) and the presacral space (9.2%).

The importance of anatomical structures and the various variables

The results show no significant correlation between the specialists' perception of the importance of the anatomical structures and years of experience ($r = 0.008$, $p = 0.914$). Furthermore, when total questionnaire responses were compared between specialists who had less than ten or more than ten years of experience, the results show no significant differences ($t(163) = -0.058$, $p = 0.954$). Similarly, there

Table 2: Numbers and percentages of specialists who considered the anatomical structures "More important" vs. "Less important".

Anatomical areas/landmarks	Anatomical structure	More important		Less important	
		n	%	n	%
Anterior abdominal wall	External oblique muscle and aponeurosis	139	85.3	9	5.5
	Internal oblique muscle and aponeurosis	138	84.7	9	5.5
	Transversus Abdominis muscle	141	86.5	6	3.7
	Rectus abdominis muscle	153	93.9	2	1.2
	Pyramidalis muscle	137	84.6	8	4.9
	Rectus sheath	158	97.5	1	0.6
	Superior epigastric vessels	137	84.6	7	4.3
	Inferior epigastric vessels	137	84.6	4	2.5
	Deep circumflex iliac	103	63.2	18	11.0
	Superficial epigastric vessels	111	69.4	13	8.1
	Superficial circumflex iliac vessels	101	63.1	13	8.1
Reproductive tract	Uterus	160	98.8	0	0.0
	Tube	161	98.8	0	0.0
	Mesosalpinx	158	96.9	0	0.0
	Ovary	160	98.8	0	0.0
	Infundibulopelvic ligament/blood vessels	156	96.3	1	0.6
Urinary tract	Pelvic ureters	138	84.7	8	4.9
	Bladder	155	95.1	0	0.0
	Urethro-vesical junction	133	81.6	13	8.0
Gastrointestinal tract	Ascending colon	119	73.0	16	9.8
	Descending colon	118	72.4	14	8.6
	Sigmoid colon	124	76.5	10	6.2
	Rectum	144	88.3	3	1.8
	Omentum	150	92.0	2	1.2
Retropubic space	Retropubic space anatomy	118	73.3	10	6.2
Presacral space	Presacral space anatomy	105	64.4	15	9.2
Pelvic major blood vessels	Common Iliac vessels	133	82.1	4	2.5
	Internal Iliac vessels	138	85.7	3	1.9
	External Iliac vessels	133	82.6	7	4.3
	Uterine vessels	154	95.1	1	0.6
Pelvic ligaments	Uterosacral ligament	154	94.5	3	1.8
	Cardinal ligament	151	92.6	4	2.5
	Round ligament	159	97.5	1	0.6
	Broad ligament	159	97.5	2	1.2
Pelvic floor and perineum	Superficial and deep transverse perineal muscles	145	89.0	3	1.8
	Bulbocavernosous muscle	140	87.0	4	2.5
	External anal sphincter	155	95.1	0	0.0
	Internal anal sphincter	155	95.7	2	1.2
	Ischioanal fossae	145	89.0	6	3.7
	Ischial spine and relation to Pudendal neuro-vascular bundle	134	82.7	8	5.0

Table 3: The anatomical structures that were considered "More important" by at least 90% of the specialists.

Structure	Number	Percentage
Rectus abdominis muscle	153	93.9
Rectus sheath	158	97.5
Uterus	160	98.8
Tube	161	98.8
Mesosalpinx	158	96.9
Ovary	160	98.8
Infundibulopelvic ligament/blood vessels	156	96.3
Bladder	155	95.1
Omentum	150	92.0
Uterine vessels	154	95.1
Uterosacral ligament	154	94.5
Cardinal ligament	151	92.6
Round ligament	159	97.5
Broad ligament	159	97.5
External anal sphincter	155	95.1
Internal anal sphincter	155	95.7

were no significant differences in the perception of the importance of the anatomical structures between male and female specialists ($t(163) = -0.698$, $p = 0.486$). Furthermore, the type of practice; private or public sector, did not influence the perception regarding the importance of the anatomical structures ($t(163) = 1.829$, $p = 0.069$).

When the responses were compared based on the average number of different common surgical procedures specialists perform annually, there were no significant differences in the overall questionnaire scores between specialists who performed the surgical procedures "More often" and those who performed them "Less often". However, there were statistically significant differences in the ratings of different individual anatomical structures. When compared to specialists who performed the procedure "More often", specialists who performed the procedure "Less often" rated 63% of the anatomical structure as "More important." (Table 5).

Table 4: The anatomical structures that were considered "Less important" by at least 5% of the specialists.

Structure	Number	Percentages
External oblique muscle and aponeurosis	9	5.5
Internal oblique muscle and aponeurosis	9	5.5
Pyramidalis muscle	8	5.0
Deep circumflex iliac	18	11.0
Superficial epigastric vessels	13	8.1
Superficial circumflex iliac vessels	13	8.1
Pelvic ureters	8	5.0
Urethro-vesical junction	13	8.0
Ascending colon	16	9.8
Descending colon	14	8.6
Sigmoid colon	10	6.2
Retropubic space anatomy	10	6.2
Presacral space anatomy	15	9.2
Ischial spine and relation to Pudendal neuro-vascular bundle	8	5.0

Table 5: Differences in total questionnaire scores and ratings of anatomical structures that were statistically different based on specialists' average number of common surgical procedures they perform every year.

Anatomical structure	Average rating of specialists who performed surgery "More often"	Average rating of specialists who perform surgery "Less often"	p-value
Surgical procedure: Caesarian section			
Total questionnaire score[a]	175.9	179.6	0.286
Pelvic ureters	4.3	4.6	0.01
Rectum	4.5	4.72	0.046
Surgical procedure: Ovarian cystectomy/oophorectomy			
Total questionnaire score[a]	176.8	178.1	0.706
Uterus	4.91	4.98	0.042
Surgical procedure: Salpingectomy			
Total questionnaire score[a]	179.8	175.2	0.182
Uterus	4.99	4.9	0.049
Urinary bladder	4.89	4.76	0.044
Surgical procedure: Abdominal hysterectomy			
Total questionnaire score[a]	177.9	177.1	0.810
Uterus	4.99	4.9	0.042
Tube	4.99	4.9	0.044
Surgical procedure: Vaginal hysterectomy			
Total questionnaire score[a]	175.6	181.4	0.117
Rectus sheath	4.81	4.96	0.044
Superior epigastric vessels	4.28	4.65	0.002
Inferior epigastric vessels	4.41	4.61	0.048
Superficial epigastric vessels	3.9	4.31	0.009
External iliac vessels	4.3	4.6	0.048
Superficial and deep transverse perineal muscles	4.41	4.62	0.017
Bulbocavernosous muscle	4.33	4.63	0.018
Surgical procedure: {Pelvic floor repair			
Total questionnaire score[a]	176.7	178.4	0.631
Deep circumflex iliac	3.72	4.09	0.035
Superficial circumflex iliac	3.76	4.12	0.027
Pelvic ureters	4.25	4.7	0.002
Retropubic space	4.01	4.33	0.046
Presacral space	3.74	4.16	0.01
External iliac vessels	4.23	4.59	0.033
External anal sphincter	4.83	4.65	0.024

(*continued on next page*)

Table 5 (*continued*)

Anatomical structure	Average rating of specialists who performed surgery "More often"	Average rating of specialists who perform surgery "Less often"	p-value
Surgical procedure: Minimal access procedure			
Total questionnaire score[a]	178.3	176.7	0.637
Superior epigastric vessels	4.54	4.25	0.047
Surgical procedure: Sub-urethral tapes (TVT/TOT)			
Total questionnaire score[a]	175.7	179.4	0.277
Pyramidalis muscle	4.32	4.6	0.008
Superior epigastric vessels	4.3	4.5	0.045
Inferior epigastric vessels	4.32	4.63	0.002
Deep circumflex iliac	3.67	4.11	0.004
Superficial epigastric vessels	3.86	4.20	0.009
Superficial circumflex iliac vessels	3.77	4.09	0.026
Uterine vessels	4.67	4.85	0.015
Surgical procedure: Repair of 3rd and 4th degree perineal tears			
Total questionnaire score[a]	179.5	176.4	0.397
Rectus sheath	4.75	4.93	0.012
Uterus	5	4.91	0.039
Tube	5	4.91	0.004
Ascending colon	4.39	3.83	0.003
Descending colon	4.41	3.89	0.019
Sigmoid colon	4.5	4.03	0.012
External anal sphincter	4.88	4.67	0.012
Surgical procedure: Vaginal vault repair/hysteropexy			
Total questionnaire score[a]	175.6	178.3	0.474
Deep circumflex iliac	3.56	4.04	0.021

[a] Comparisons using independent-samples t-test. All other comparisons using Mann–Whitney *U* test.

Discussion

The response rate in our study was 69.3%. Asch et al.[11] reviewed 178 questionnaire-based manuscripts and concluded that the response rate tended to be moderate. They also identified that questionnaires followed by reminders were associated with 13% more response rate. This was shown in our result.

The structures that were considered "More important" by over 90% of the respondents (Table 3) are, in fact, structures that most specialists deal with on a regular basis, and only 3.5% of the specialists considered some or all of the structures as "Less important." This reflected the ability of recruited specialists to identify anatomical structures most relevant for resident doctors to identify during surgical operations. The structures that were considered "Less important" by at least 5% of the specialists (Table 4), are either structures that are relatively not in close proximity to the surgical fields, such as ascending and descending colon or were more relevant for advanced surgical procedures. These structures included the pelvic ureter, presacral and retropubic spaces, and the ischial spine/pudendal neurovascular bundle/sacrospinous ligament. These structures are more relevant for urogynaecology procedures where training at performing such procedures is either gained at a later stage of the residency programme or as part of the sub-speciality training, which is in keeping with the core curriculum of the American College of Obstetricians and Gynecologists.[12]

According to their workload in various common surgical procedures; specialists who perform the procedures "Less often" tended to rate the importance of anatomical structures higher. This was observed in 63% of the case, and the differences were statistically significant (Table 5). A possible explanation may be that senior specialists are more aware of what anatomical structures resident doctors should be able to identify at the different stages of their training. In addition, the limited surgical expertise of some junior specialists in managing complications may have influenced their opinions on the rating of the importance of the structures, where they rated more structures as "More important" than they should be.

The core curriculum of the American College of Obstetricians and Gynaecologists requires resident doctors at various stages of their training to be able to safely perform various surgical procedures.[12] To perform safe surgery, it is crucial to be knowledgeable about anatomy, particularly in cases of distorted anatomy which may result from adhesions and intraoperative haemorrhage.[13] Furthermore, complications during gynaecological surgical operations may result from the proximity of the gynaecological organs to the urinary tract, bowel, nerves and vasculature. Ortiz-Martínez et al.[14] reported a 3.8% overall prevalence rate of complications for gynaecological surgery, where minor and major complications accounted for 1.8% and 2% respectively.

Our results show that all anterior abdominal wall anatomical structures were rated as "More important" by the majority of specialists. Munro et al.[15] estimated a 0.04%–0.5% incidence of major injury to anterior abdominal wall vessels during laparoscopic gynaecological procedures. Moreover, the most commonly involved structures were the inferior epigastric vessels,[16] which were recognised as a "More important" anatomical structure in our study. Furthermore, injuries to iliohypogastric or ilioinguinal nerves may result in postoperative neuropathic pain which, if unrecognised and not treated properly, may lead to chronic abdominopelvic pain.[17] We acknowledge that we have not included nerves as relevant structures in our study.

The results of our study reflect the importance of the urological system to gynaecological surgery. The bladder, and to a lesser extent, the ureters and the urethra-vesical junction were considered as "More important" structures for a third-year resident doctor to be able to identify during surgical operations. Urological injuries are a known morbid sequel of gynaecological surgeries.[18] The incidence varies

according to the type and complexity of the surgery.[19] In addition, urinary tract injuries complicate 0.2%–1% of all gynaecological procedures.[20]

The incidence of gastrointestinal injuries during gynaecological surgeries varies, depending on the underlying pathology and the type of surgery. It was reported to be 0.3% after simple hysterectomy,[21] and 0.13% during laparoscopic procedures.[22] The common sites of injuries are the small bowels, followed by the large bowels, the rectum, and the stomach.[23] Our results show that none of the gastrointestinal organs was among the 90% "More important" organs that a third-year resident doctor should be able to identify, probably because at this stage, residents are more likely to be trained to perform less complex procedures.

Vaginal surgical procedures may be associated with morbidity and rarely mortality.[24] These may include bleeding and injury to adjacent organs.[25] Raz et al.[26] showed that knowledge of related anatomy and surgical expertise may reduce the risk of complications. Our results show that while the urinary bladder was rated "More important" by over 90% of specialists, the urethra-vesical junction and the Ischial spine with the related Pudendal neurovascular bundle were not. This is probably related to the relative importance of these structures at a particular stage of training. While the bladder is encountered during common surgical procedures such as caesarean sections and anterior vaginal wall repair, the vesico-urethral junction and the Pudendal neurovascular bundle are more related to specialised procedures such as sub-urethral tapes and sacrospinous hysteropexy/colpopexy, respectively. Furthermore, the external and internal anal sphincters were rated as important by over 90% of the specialists. The overall incidence of obstetric anal sphincter injuries (OASIS) is 2.9%.[27] The Royal College of Obstetricians and Gynaecologists' guideline recognised that OASIS repair by inexperienced surgeons may contribute to subsequent faecal incontinence. Therefore, adequate knowledge of the anatomy of the anal sphincter is required for proper repair.[28]

A recent meta-analysis on the presence of resident doctors in the operating theatre with the attending gynaecologists showed that while their presence was associated with an increased risk of blood transfusion and longer operating time; it was not associated with increased risk of injuries to adjacent organs, unplanned return to theatre, or increased risk of wound infection.[29] In addition, another report showed that the involvement of specialists was associated with a significant decrease in both morbidity and mortality rates.[30] The findings of such reports emphasised the safe presence of residents in the operating theatres, supervised by specialists, which is necessary for their training. While operating theatre sessions may not be enough, resident doctors may attend specialised surgical anatomy courses and workshops, which were perceived by residents as important for their training.[31]

We acknowledge the limitations of our study; not all relevant anatomical structures are i.e., nerves, some of the included structures are considered very easy for residents to identify, and the definition of "important" in our study is subjective. Future studies involving larger numbers of specialists of various interests and covering all training years, in addition to studies evaluating resident's perception of anatomy knowledge, may establish a reference list for training.

Conclusion

Anatomy knowledge is important for residency training in obstetrics and gynaecology. Specialists' perception of the importance of various anatomical structures reflects their understanding of the training requirements. Future research that is larger in scope may establish a reference for what applied anatomy knowledge is required for each training year.

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Conflict of interest

The authors have no conflict of interest to declare.

Ethical approval

Ethical approval was granted by the Institutional Review Board of the Specialty Hospital. Number: 99288/5/1/ت, approval date: 15/9/2019.

Authors' contribution

IAM, FA, LM and DB conceived and designed the study, and drafted and edited the manuscript. HA and SA undertook data collection, data entry, prepared tables and figures and edited the manuscript. MM revised the methods, performed the statistical analysis, and edited the manuscript. I AM supervised all aspects of the study. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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