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

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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 surgical operations.

The results: The most important surgical structures identified by the specialists were:

- The bladder (96.4%)
- The appendix (96.4%)
- The ovaries (96.4%)
- The fallopian tubes (96.4%)
- The uterus (96.4%)
- The fallopian tubes (96.4%)
- The ovaries (96.4%)
- The appendix (96.4%)
- The bladder (96.4%)
- The fallopian tubes (96.4%)

The least important surgical structures identified by the specialists were:

- The small intestine (4.2%)
- The large intestine (4.2%)
- The rectum (4.2%)
- The sigmoid colon (4.2%)
- The small intestine (4.2%)
- The large intestine (4.2%)
- The rectum (4.2%)
- The sigmoid colon (4.2%)
- The small intestine (4.2%)
- The large intestine (4.2%)

The specialists’ suggestions for improving the identification of surgical structures are:

1. Improved training programmes for residents
2. Regular surgical audits
3. Enhanced communication between the surgical and obstetric teams
4. Use of surgical simulators
5. Continuous professional development

Conclusion: 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.
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, others believe that it should be an applied subject and should be taught by surgeons. 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. 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.

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. 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. Shayeh et al. 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 specialties, with surgical specialties considering it more important than medical specialties.

Sgroi et al., 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. 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 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 at the different stages of their training.

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, either public or private, and their average workload in different common O&G surgical procedures.
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, 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$^c$ | 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$^d$ | 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$^d$ | 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$^c$ | 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).
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

| 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 | 1 | 0.6 |
| Inferior epigastric vessels | 137 | 84.6 | 4 | 2.5 |
| Deep circumflex iliac      | 103 | 63.2 | 18 | 11.0 |
| Superior epigastric vessels | 111 | 69.4 | 13 | 8.1 |
| Superficial epigastric 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 |
| Bulbocavernosus 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 |
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 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       |

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        | 8      | 5.0         |
| neuro-vascular bundle                         |        |             |

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             | 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|                                                                 |                                                                |         |
| Total questionnaire score             | 176.8                                                            | 178.1                                                          | 0.706   |
| Uterus                               | 4.91                                                             | 4.98                                                           | 0.042   |
| Surgical procedure: Salpingectomy     |                                                                 |                                                                |         |
| Total questionnaire score             | 179.8                                                            | 175.2                                                          | 0.182   |
| Uterus                               | 4.99                                                             | 4.9                                                            | 0.049   |
| Surgical procedure: Abdominal hysterectomy |                                        |                                                                |         |
| Total questionnaire score             | 177.9                                                            | 177.1                                                          | 0.810   |
| Uterus                               | 4.99                                                             | 4.9                                                            | 0.042   |
| Surgical procedure: Vaginal hysterectomy |                                                |                                                                |         |
| Total questionnaire score             | 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   |
| Bulbocavernous muscle                | 4.33                                                             | 4.63                                                           | 0.018   |
| Surgical procedure: {Pelvic floor repair |                                                |                                                                |         |
| Total questionnaire score             | 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 performed surgery “Less often” | p-value |
|----------------------|---------------------------------------------------------------|---------------------------------------------------------------|---------|
| Surgical procedure: Minimal access procedure | | | |
| Total questionnaire score | 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 | 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 vessels | 3.67 | 4.11 | 0.004 |
| Superficial epigastric vessels | 3.86 | 4.2 | 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 | 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 | 175.6 | 178.3 | 0.474 |
| Deep circumflex iliac vessels | 3.56 | 4.04 | 0.021 |

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. 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/sacropinous 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.

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 Gynecologists requires resident doctors at various stages of their training to be able to safely perform various surgical procedures. 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. 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. 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. 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, 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. 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 morbidity sequel of gynaecological surgeries. The incidence varies
according to the type and complexity of the surgery. In addition, urinary tract injuries complicate 0.2%–1% of all gynaecological procedures.

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, and 0.13% during laparoscopic procedures. The common sites of injuries are the small bowels, followed by the large bowels, the rectum, and the stomach. 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. These may include bleeding and injury to adjacent organs. Raz et al. 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%. 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.

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. In addition, another report showed that the involvement of specialists was associated with a significant decrease in both morbidity and mortality rates. The findings of such reports emphasised the safe operating theatre with the attending gynaecologists and the type of surgery. It was reported to be 0.3% during laparoscopic surgeries varies, depending on the underlying pathology and the type of surgery. It was reported to be 0.3% during laparoscopic procedures.

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: 99288/51/○, 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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