

A Deficiency in Knowledge of Basic Principles of Laparoscopy Among Attendees of an Advanced Laparoscopic Surgery Course

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INTRODUCTION: Advanced laparoscopic courses serve as a comprehensive and popular Continuing Medical Education (CME) activity. Knowledge of basic laparoscopy is an assumed prerequisite for attendance at these courses.

OBJECTIVE: To determine the baseline laparoscopic knowledge of attendees at an advanced laparoscopic surgical course.

METHODS: A 17-question examination was designed using data from the basic laparoscopic quizzes on the Society of American Gastrointestinal Surgeons (SAGES) website (<http://www.sages.org/education/quiz>). The questions covered 4 realms of basic laparoscopy: access, pneumoperitoneum, camera navigation, and surgical instrumentation. The questionnaire was distributed to all attendees at an advanced laparoscopic course at the 2009 Canadian Surgical Forum organized by the Canadian Association of General Surgeons.

RESULTS: Forty-three respondents completed the survey. Fifty-three percent (53%) of responders had been in practice for more than 10 years and 65% had over 5 years experience. Fifty-five percent (55%) [24/43] of respondents listed laparoscopic courses as the sole means of laparoscopic training. Sixty-one percent (61%) [28/43] were performing > 50 laparoscopic cases per year. The median score on the knowledge-based questions was 70.6% [12/17]. In terms of overall score, respondents with more than 5 years experience performed similarly to respondents with less than 5 years experience (73% correct answers). Interestingly, in a subgroup analysis, respondents performed well in camera skills and pneumoperitoneum-themed questions (84% correct answers) but performed poorly on questions pertaining to instrumentation or access (52% correct answers).

CONCLUSION: Basic laparoscopic knowledge among the attendees of an advanced laparoscopic course is suboptimal. A review of basic principles of laparoscopy particularly per-

training to instrumentation and access should form part of these CME activities. (J Surg xx:xxx. © 2010 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: laparoscopy, training, minimally invasive surgery

COMPETENCY: Basic Laparoscopy Training

INTRODUCTION

Advanced laparoscopic courses are the mainstay of Continuing Medical Education (CME) activities at surgical conferences and are attended by surgeons and trainees for the purpose of meeting learning objectives with regard to laparoscopic skill acquisition.¹⁻³ These courses focus on conveying special techniques of laparoscopic surgery to those with some proficiency in open surgery as well as basic laparoscopy.⁴ Attendees at these courses are made up of practicing surgeons, Minimally Invasive Surgery (MIS) fellows, and residents in training.⁵ It is expected, not unreasonably, that attendees would have a sound knowledge of basic laparoscopy.

The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) in association with the American College of Surgeons have developed the Fundamentals of Laparoscopic Surgery (FLS)—a comprehensive program designed to teach cognitive and psychomotor aspects unique to laparoscopic surgery.⁶ This program includes didactic modules for education and an examination to assess competency and is now a requirement before taking the American Board of Surgery theory examination.⁷

The objective of our study was to determine the baseline laparoscopic knowledge of attendees at an advanced laparoscopic surgical course utilizing questions adapted from topics covered in the FLS program as well as the online SAGES quiz on basic laparoscopy. The survey was validated by three independent experienced laparoscopic surgeons.

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TABLE 1. Example Survey Questions

- Q. After connecting the Veress needle to an insufflator there is no pressure and no flow of gas which is the following is likely the case:
- The Veress needle has penetrated liver parenchyma
 - The Veress needle has penetrated the colon
 - The CO₂ tank is empty or the valve is closed
 - The insufflator tubing is disconnected from the insufflator
 - The patient has a pneumothorax—immediately place a chest tube
- (the correct answer: c)
- Q. Which of the following is the most likely reason for a blurred or hazy image when the laparoscope is inserted into the abdominal cavity:
- The laparoscope is too cold
 - The light cable is damaged
 - Insufflation is inadequate
 - The camera head is fault
- (correct answer a)
- Q. A white cartridge for linear and TL stapler typically denotes:
- Regular wire load
 - Vascular load
 - Heavy wire load
 - Regular gauge wire
- (correct answer b)

METHODS

Subjects

The attendees of laparoscopic advanced colorectal course at the Canadian Association of General Surgeons’ Conference in Victoria, BC (September 2009) participated in this study. Course attendees comprised residents at various stages of training, MIS fellows, and practicing surgeons. The course attendance varied during the day, but 108 participants were registered for the course. Forty-three participants completed the survey.

Questionnaire

A survey comprising 17 questions derived in part from a SAGES online quiz on basic laparoscopy and the fundamentals of laparoscopic surgery program was handed out to all participants. Three initial questions were on demographic data, including experience in years, laparoscopic training, and the approximate advanced and basic MIS case volumes per year. Participants were grouped for analysis into residents, those with less than 5 years experience, those with 5-10 years experience, and those with more than 10 years experience.

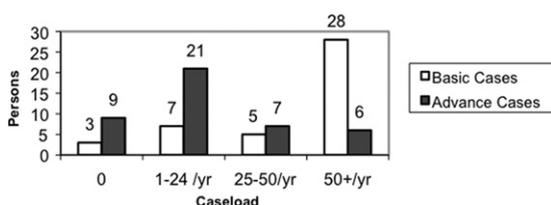


FIGURE 1. Basic and advanced MIS caseload per year.

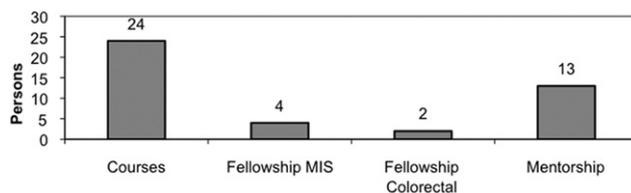


FIGURE 2. Training.

Minimally invasive surgery case volumes were grouped into less than 24 cases per year, 25-50 per year and more than 50 per year. The data were collected on basic laparoscopy laparoscopic operations as well as advanced laparoscopy. Questions 4-20 were divided into 4 groups covering aspects of basic laparoscopy, such as access, pneumoperitoneum, and camera/lighting and surgical instrumentation (Table 1 shows an example of questions on Access, pneumoperitoneum and instrumentation). The data were collected anonymously and collated for analysis.

Statistical Analysis

A statistical analysis was carried out using Stata 10 (StataCorp LP, College Station, Texas). The analysis included summarization of demographic data and one-way analysis of variance.

RESULTS

Demographics

Of the 43 participants, six participants had been in practice for between 1-5 years, 5 had been in practice between 6 and 10 years, and 23 had more than 10 years practice experience. Experience of minimally invasive surgery varied, with 28/43 subjects performing more than 50 basic MIS cases per year and 21/43 subjects reported to be performing up to 24 advanced MIS cases per year (Fig. 1). More than half of the participants (24/43) stated that advanced laparoscopic courses formed in the main source of MIS training (Fig. 2).

The overall average score of correct answers was 73%—this compared similarly when the group was divided into those with less than 5 years experience and those with more than 5 years experience (Fig. 3). No correlation was found among experience, type of MIS training, or MIS caseload, and overall scores among subjects.

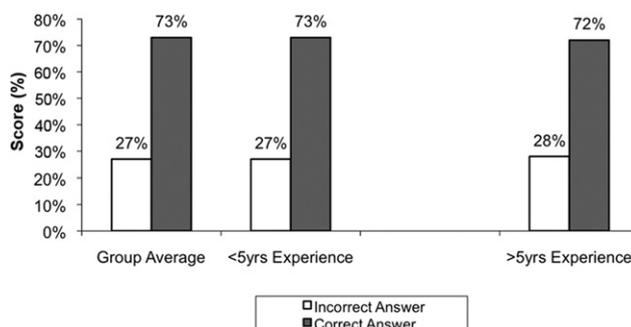


FIGURE 3. Overall scores by surgical experience.

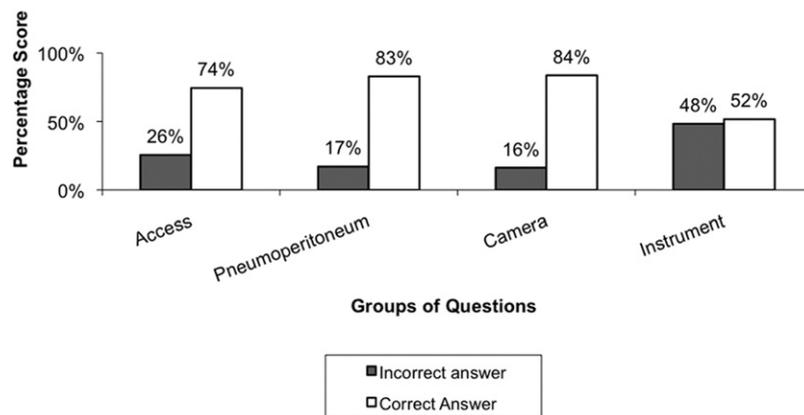


FIGURE 4. Overview of answer scores.

Respondents performed well on questions pertaining to pneumoperitoneum (83% correct answers) and the laparoscope/camera; however, they performed significantly worse on instrumentation (52% correct answers) $p < 0.01$ (Fig. 4). The active blade in the harmonic scalpel was correctly identified in a picture by only 9/43 (21%) respondents.

DISCUSSION

With the evolution of advanced laparoscopy, surgeons in practice and trainees depend on advanced laparoscopic courses to acquire new skills and review current technical advances. Most advanced laparoscopic courses presume a basic knowledge of laparoscopy among attendees, and review of basic laparoscopic principles is not usually part of the course structure.

The SAGES position paper on integrating advanced laparoscopy into surgical residency training suggests that training in advanced laparoscopic operations begins with the acquisition of skills in basic laparoscopy.⁵ The findings of our study suggest that knowledge of basic laparoscopy as per criteria set out in the FLS program and the SAGES online quiz is suboptimal among this representative group of surgeons within interest in advanced laparoscopy. The results show that although the group performed reasonably well as a whole, there were certain gaps in basic laparoscopic knowledge base particularly with regard to surgical instrumentation and access. The group comprised surgeons who reported to carry out some advanced laparoscopic surgery, but no correlation was found between overall scores and laparoscopic experience.

An interpretation of the results must take into account that less than 50% of those surveyed completed the questionnaire. However, this remains a representative sample of surgeons who normally attend advanced laparoscopic courses.

We recommend that it might be necessary to include a review of basic laparoscopy on courses in advanced laparoscopy and perhaps make FLS certification a recommendation for registration on these courses. For those do not have FLS certification,

the program and a testing station may be offered to the attendees who express interest in advanced laparoscopic courses.

CONCLUSIONS

Basic laparoscopic knowledge among the attendees of an advanced laparoscopic course is suboptimal. A review of basic principles of laparoscopy particularly pertaining to instrumentation and access should form part of these CME activities.

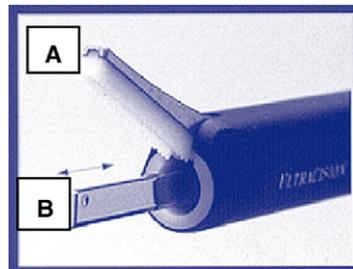
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CAGS Laparoscopy Survey:

1. Experience (years in practice or residency level): _____ yrs or PGY_____
 2. Laparoscopic Training (check all that apply):
 _____ Courses/Symposia _____ Colorectal fellowship
 _____ Fellowship in MIS _____ Mentoring
 3. Approximate MIS case volumes/yr:
 _____ Appendectomy _____ Bariatric
 _____ Cholecystectomy _____ Colorectal
 _____ Diagnostic laparoscopy _____ Foregut
- Circle the best answer:
4. The Veress needle is the preferred technique after laparotomy and may be inserted with extreme caution
 - a. True
 - b. False
 5. The Hasson technique is the access method of choice when extensive intra-abdominal adhesions are suspected
 - a. True
 - b. False
 6. After insertion of the Veress needle, which maneuvers assess its position:
 - a. Aspiration with a syringe
 - b. Injection and aspiration of saline
 - c. Position a drop of saline on the hub of the needle to see if it flows freely into the abdomen
 - d. Connect to an insufflator and assess pressure and flow
 - e. All of the above methods may be used
 7. After connecting a Veress needle to an insufflator there is low pressure and no flow of gas. Which of the following is likely the case:
 - a. The Veress needle has penetrated liver parenchyma
 - b. The Veress needle has penetrated the colon
 - c. The CO₂ tank is empty or the valve is closed
 - d. The insufflator tubing is disconnected from the insufflators
 - e. The patient has a pneumothorax - immediately place a chest tube
 8. The gas most commonly used to establish pneumoperitoneum is:
 - a. O₂
 - b. CO₂
 - c. N₂
 - d. CO
 - e. Room air
 9. After establishing a pneumoperitoneum (by Veress or Hasson) the anaesthetist is concerned that the patient is tachycardic, hypotensive and difficult to ventilate. The next best step is to
 - a. Proceed immediately to full laparotomy
 - b. Check insufflation pressures and desufflate
 - c. Immediately place a chest drain
 - d. Tell the anaesthetist to increase the intravenous infusion rate

10. Which of the following absorbs light and contributes to a poor image during laparoscopy:
 - a. Fat
 - b. Muscles
 - c. Blood
 - d. Liver tissue
11. The most common cause of incisional hernia after a laparoscopic procedure is:
 - a. Faulty suturing of the abdominal wall at a 10mm trocar site
 - b. Failure to suture the abdominal wall at a 5mm trocar site
 - c. Use of more than four trocars
 - d. Use of vicryl suture for fascia
12. When using a 30° laparoscope and the light cord is at the 3 o'clock position, you are looking towards:
 - a. 12 o'clock
 - b. 3 o'clock
 - c. 6 o'clock
 - d. 9 o'clock
13. When using a 30° laparoscope and the light cord is at the 6 o'clock position, you are looking towards:
 - a. 12 o'clock
 - b. 3 o'clock
 - c. 6 o'clock
 - d. 9 o'clock
14. Which of the following is the most likely reason for a blurred or hazy image when the laparoscope is inserted into the abdominal cavity:
 - a. The laparoscope is too cold
 - b. The light cable is damaged
 - c. Insufflation is inadequate
 - d. The camera head is faulty
15. When using monopolar cautery and the active instrument touches the laparoscope, which of the following may occur:
 - a. Damage to the laparoscope because of short circuiting
 - b. Direct coupling and skin injury at point of monopolar cautery entry
 - c. Direct coupling and skin injury at point of laparoscope entry
 - d. Thermal injury to intra-abdominal viscera in proximity to the laparoscope
16. Which is the "hot" blade on the harmonic scalpel:



- c. A and B
- d. Neither A or B

- 17.** What should a scrub nurse do routinely before reloading a linear stapler:
- a.** Wipe the anvil to ensure it is clear of staples and debris
 - b.** Have a suture ready to oversee the staple line
 - c.** Engage the cam mechanism
 - d.** Replace the safety
- 18.** When dividing thick tissue (i.e. stomach antrum) that compresses to 2.0mm which stapler cartridge would be optimal:
- a.** White
 - b.** Blue
 - c.** Green
 - d.** Grey
- 19.** A white cartridge for linear and TL stapler typically denotes:
- a.** Regular wire load
 - b.** Vascular load
 - c.** Heavy wire load
 - d.** Regular gauge wire
- 20.** White balance of the light source is necessary:
- a.** To account for different optical qualities of laparoscopes
 - b.** To account for variation in lengths of light cables
 - c.** To account for wear and tear on the camera lens system
To account for wear in the lamp and a changing color temperature