Outcomes of an innovative training course in laparoscopic hernia repair

D Light, S Bawa, P Gallagher, L Horgan

Northumbria NHS Trust, North Shields, UK

ABSTRACT

INTRODUCTION The Ethicon™ laparoscopic inguinal groin hernia training (LIGHT) course is an educational course based on three days of teaching on laparoscopic hernia surgery. The first day involves didactic lectures with tutorials. The second day involves practical cadaveric procedures in laparoscopic hernia surgery. The third day involves direct supervision by a consultant surgeon during laparoscopic hernia surgery on a real patient. We reviewed our outcomes for procedures performed on real patients on the final day of the course for early complications and outcomes.

METHODS A retrospective study was undertaken of patients who had laparoscopic hernia surgery as part of the LIGHT course from 2013 to 2015. A matched control cohort of patients who had elective laparoscopic hernia surgery over the study period was identified. These patients had their surgery performed by the same consultant general surgeons involved in delivering the course. All patients were followed up at 6 weeks postoperatively.

RESULTS A total of 60 patients had a laparoscopic inguinal hernia repair and 23 patients had a laparoscopic ventral hernia repair during the course. The mean operative time for laparoscopic inguinal hernia repair was 48 minutes for trainees (range 22–90 minutes) and 35 minutes for consultant surgeons (range 18–80 minutes). There were no intraoperative injuries or returns to theatre in either group. All the patients operated on during the course were successfully performed as daycase procedures. The mean operative time for laparoscopic ventral hernia repair was 64 minutes for trainees (range 40–120 minutes) and 51 minutes for consultant surgeons (range 30–130 minutes).

CONCLUSIONS The outcomes of patients operated on during the LIGHT course are comparable to procedures performed by a consultant. Supervised operating by trainees is a safe and effective educational model in hernia surgery.

KEYWORDS

Education – Simulation – Laparoscopic inguinal hernia repair

Accepted 23 April 2017

CORRESPONDENCE TO

Duncan Light, E: Duncan.light@hotmail.co.uk

Introduction

In an era of reduced training time for surgical trainees there is an awareness that training needs to be formalised beyond traditional forms of surgical education.¹ A Cochrane review on laparoscopic skills box training has shown benefits in improving technical skills for novice trainees.² With this in mind, the Royal College of Surgeons in the UK has devised formal simulation courses in laparoscopic surgery. In North America, this has also been developed by SAGES as the fundamentals of laparoscopic surgery to train surgeons.

The challenge for surgical simulation is in bridging the gap between theory and practice. This is notably the case in more advanced laparoscopic surgery, which may not be so reproducible in the simulated environment. As such, there is a need to effectively train surgeons for more specific and advanced procedures.

The Ethicon™ laparoscopic inguinal groin hernia training (LIGHT) course is an educational course based on 3 days of teaching on laparoscopic hernia surgery. The first day

involves didactic lectures with tutorials. The second day involves practical cadaveric procedures in laparoscopic hernia surgery. The third day involves direct supervision by a consultant surgeon during laparoscopic hernia surgery on a real patient. We reviewed our outcomes for procedures performed on real patients on the final day of the course for early complications and outcomes.

Methods

A retrospective study was undertaken of patients who had laparoscopic hernia surgery as part of the LIGHT course from 2013 to 2015. This course is sponsored by Ethicon and is aimed at surgeons with experience in laparoscopic surgery, with a view to developing skills in laparoscopic hernia surgery. Patients were recruited to the course voluntarily and were given an explanation of the training course. Patients with a recurrent hernia or a large ventral hernia (greater than 8 cm defect) were excluded. The inclusion criteria were that patients should be suitable for day surgery.

Informed written consent was taken for all the volunteers. The study was approved by the institutional research board of the Northumbria NHS Trust.

The LIGHT course takes place over 3 days spread over several months. The first day incorporates didactic lectures and tutorials on hernia surgery, including the specific operative steps in laparoscopic hernia repair. The second day involves supervised simulated laparoscopic hernia surgery in a cadaveric simulation laboratory. The third day involves directly supervised live operating on volunteer patients. The supervisor is a qualified consultant general surgeon with an interest in hernia surgery. A transabdominal pre-peritoneal laparoscopic inguinal hernia repair was performed on this third day (trainer preference). The operation can be safely taken over at any time during the procedure, if necessary, for safety or instruction purposes. Routine postoperative care was provided to all the patients on the unit. A matched control cohort was identified of patients who had elective laparoscopic hernia surgery over the study period. These patients had their surgery performed by the same consultant general surgeons involved in delivering the course. All patients were followed up at 6 weeks post-operatively. The outcome measures were peri- and postoperative complications, postoperative stay, readmission and hernia recurrence (less than 6 months).

Statistical analysis was performed using SPSS software (v.21). Non-parametric data were analysed using the Mann-Whitney-U test. A power calculation was performed, which suggested a minimum of 32 cases in each group to demonstrate a statistical difference.

Results

A total of 60 patients had a laparoscopic inguinal hernia repair and 23 patients had a laparoscopic ventral hernia repair during the course. These were matched to a representative control cohort (Table 1).

Laparoscopic inguinal hernia repair

The mean operative time for laparoscopic inguinal hernia repair was 48 minutes for trainees (range 22–90 minutes) and 35 minutes for consultant surgeons (range 18–80 minutes). This was statistically significant ($P < 0.002$). There were no intraoperative injuries or returns to theatre in either group. All operations during the course were successfully performed as daycase procedures. One patient in the trainees group had a postoperative seroma and two in the consultant surgeons group. These were managed conservatively. No patients developed a haematoma in either group. One patient reported chronic groin pain at 6-week follow-up in the trainees group and one in the consultant surgeons group. There were no port site hernias. One patient developed an early recurrence in each group. Both patients had a large direct inguinal hernia in their initial surgery. Both were taken for a subsequent open inguinal hernia repair.

Laparoscopic ventral hernia repair

The mean operative time for laparoscopic ventral hernia repair was 64 minutes for trainees (range 40–120 minutes)

Table 1 Demographics of the study

Demographic	Trainee group (<i>n</i> = 83)	Consultant group (<i>n</i> = 83)
Mean age (years) (range)	59 (25–83)	65 (23–85)
Male	70	65
Female	13	18
Laparoscopic hernia repair:		
Inguinal	60	60
Ventral	23	23

and 51 minutes for consultant surgeons (range 30–130 minutes). This was not statistically significant ($P = 0.1$). There were no intraoperative injuries or returns to theatre in either group. All the operations during the course were successfully performed as daycase procedures. Two patients in the trainees group had a postoperative seroma and one in the consultant surgeons group. These were managed conservatively. No patients developed a haematoma in either group. One patient reported chronic pain at 6-week follow-up in the trainees group and two in the consultant surgeons group. There were no port site hernias. One patient developed an early recurrence in the consultant surgeon group and none in the trainees group.

Discussion

The historic culture in surgery was the ‘do one, see one, teach one’ principle. With a growing culture of safety and awareness of human factors, it has become increasingly recognised that this is not acceptable in high-risk environments in health care. A national committee for trainees in surgery has supported the use of simulation in surgery but has expressed a number of concerns.⁵ The concerns are centred on the need to integrate the skills acquired at simulation sessions into daily practice. Trainees have identified that they lose skills learnt on the simulation courses if they do not repeat them following the course. The committee has also advocated the integration of simulation into the formal curriculum for surgical trainees.

Although there are robust data to support simulation in training novice surgeons,^{2,4} there are conflicting data in the literature on the transferability of laparoscopic skills training to operating room performance. There have been some studies showing that these skills may not be transferable to the operating room directly.⁵ However, a systematic review of virtual reality training in laparoscopic surgery has shown improvements in operating room performance.⁶

Some instructional institutions have used live pigs for learning advanced laparoscopic surgery.⁷ This may be a valid method for gastrointestinal procedures but it has a limited role in hernia surgery. Another option is the use of cadaveric models. A recent study in arthroscopy has shown improvements in operating room performance by trainees following training on cadaver material.⁸ We used access to a

cadaveric laboratory in the LIGHT course and have found it beneficial in teaching trainees the steps of a procedure. Pre-peritoneal dissection is very similar in cadavers and offers a good exposure to trainees before performing the procedure in live patients.

A study by Kurashima *et al.* has shown the benefit of simulation training in the performance of totally extraperitoneal laparoscopic inguinal hernia repair.⁹ They showed that residents who attended the simulation course had improved performance in the operating room following an episode of specific simulation training.

The LIGHT course was developed as a result of the gap in training this procedure. This was modified from a model used in bariatric surgical training (SORTED course, Ethicon). This incorporated a combination of didactic lectures and tutorials, a cadaveric simulation lab and then supervised surgery. A study by Henniford *et al.* investigated the role of mentorship in relation to simulation courses for laparoscopic hernia repair.¹⁰ They found that surgeons who were mentored in the operating room in combination with a simulated laparoscopic hernia course were more likely to subsequently perform laparoscopic hernia repair in their practice. This is important in the transferability of skills from a course, in that it is important that surgeons may use the skills learnt in their daily practice within a short period after the course. The same study also showed that surgeons with experience of performing other advanced laparoscopic procedures were more likely to integrate laparoscopic hernia repair into their practice following a simulation hernia course than surgeons with limited experience in laparoscopy. This is an important consideration for recruitment to more advanced courses, in that candidates will benefit more if they already have a developed skills base.

We have previously published results from laparoscopic training courses in our institution with supervised operating and have shown no variation between procedures performed by trainees or consultants.¹¹ The LIGHT course is a development of this course structure specifically designed for training laparoscopic hernia repair. We feel that the combination of theory in a didactic session with simulation improved the effectiveness of training. We also believe that directly supervised surgery during the course offers a significant benefit in transferring these skills to the operating room.

We have shown no variation between procedures supervised directly and by consultant-performed procedures, apart from in operative time. This supports the safe practice

of supervised training in the operating room and specifically supports the practice of the LIGHT course. The operative time is important to note in that it supports the necessary time concessions, which must be made to support surgical training in the operating room.

Conclusions

The outcomes of patients operated on during the LIGHT course are comparable to procedures performed by a consultant. Supervised operating by trainees is a safe and effective educational model in hernia surgery.

Acknowledgements

We acknowledge Ethicon Education in support of the LIGHT course. We also acknowledge the work by Mr Simon Monkhouse (consultant surgeon) in establishment of the LIGHT course.

References

1. Epstein J. Reducing working hours and surgical training in the UK. *Surgery* 2004; **22**: 1–2.
2. Nagendran M, Toon CD, Davidson BR *et al.* Laparoscopic surgical box model training for surgical trainees with no prior laparoscopic experience. *Cochrane Database Syst Rev* 2014; **(1)**: CD010478.
3. Association of Surgeons in Training. *Simulation in Surgical Training*. London: AST; 2011.
4. Zendejas B, Ruparel RK, Cook DA. Validity evidence for the Fundamentals of Laparoscopic Surgery (FLS) program as an assessment tool: a systematic review. *Surg Endosc* 2016; **30**(2): 512–520.
5. Steigerwald SN, Park J, Hardy KM *et al.* The Fundamentals of Laparoscopic Surgery and LapVR evaluation metrics may not correlate with operative performance in a novice cohort. *Med Educ Online* 2015; **20**(1):30024.
6. Nagendran M, Gurusamy KS, Aggarwal R *et al.* Virtual reality training for surgical trainees in laparoscopic surgery. *Cochrane Database Syst Rev* 2013; **(8)**: CD006575.
7. Kirwan WO, Kaar TK, Waldron R. Starting laparoscopic cholecystectomy: the pig as a training model. *Ir J Med Sci* 1991; **160**(8): 243–246.
8. Camp CL, Krych AJ, Stuart MJ *et al.* Improving resident performance in knee arthroscopy: a prospective value assessment of simulators and cadaveric skills laboratories. *J Bone Joint Surg Am* 2016; **98**(3): 220–225.
9. Kurashima Y, Feldman LS, Kaneva PA *et al.* Simulation-based training improves the operative performance of totally extraperitoneal (TEP) laparoscopic inguinal hernia repair: a prospective randomized controlled trial. *Surg Endosc* 2014; **28**(3): 783–788.
10. Henniford BT, Matthews BD, Box EA *et al.* Optimal teaching environment for laparoscopic ventral herniorrhaphy. *Hernia* 2002; **6**(1): 17–20.
11. Kanakala V, Bawa S, Gallagher P *et al.* Outcome of patients in laparoscopic training courses compared to standard patients. *Surgeon* 2010; **8**(3): 132–135.