

Laparoscopic appendicectomy: a trainee's perspective

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Minimally invasive surgery is rapidly becoming an integral part of general surgery. Many general surgeons have been trained to undertake laparoscopic cholecystectomy. It has been recommended that laparoscopic appendicectomy should be the training operation for junior surgeons. The aim of our study was to assess whether laparoscopic appendicectomy training can safely be introduced to junior surgeons in a district general hospital. During the 11 month study period, 27 laparoscopic and 38 open appendicectomies were performed. The median anaesthetic time was 80 min for laparoscopic and 52.5 min for open appendicectomies. Laparoscopic appendicectomies cost, on average, £618 and open appendicectomies £770 per case. The complication rate between the two procedures was equal. We therefore showed that laparoscopic appendicectomy by junior surgeons is both safe and cost-effective. Although the registrar did most of the laparoscopic appendicectomies, with resultant less operating for the SHO, laparoscopic appendicectomy provided the SHO with training in diagnostic laparoscopy and laparoscopic dissection. We conclude that basic laparoscopic training should be introduced early in surgical training, after which laparoscopic appendicectomy is a safe procedure for surgical trainees.

Minimally invasive surgery is rapidly becoming an integral part of general surgery (1). Many experienced general surgeons have been trained safely to undertake laparoscopic cholecystectomy (2–4). Laparoscopic appendicectomy for acute appendicitis has been performed by European surgeons since 1983 (5, 6). Recent prospective, randomised trials have suggested that laparoscopic removal of an inflamed appendix may have benefits over open surgery (7, 8). Furthermore, it has been recommended that laparoscopic appendicectomy should be the training operation of choice for junior surgeons (9–11). Consequently, we undertook a retrospective study of appendicectomies carried out in a district general hospital (DGH) to assess whether laparoscopic appendicectomy training for junior surgeons can be both safe and cost-effective.

Materials and methods

The registrar and senior house officer (SHO) of a single surgical firm with a special interest in surgical oncology were assessed. Neither had performed laparoscopic surgery before joining the firm. The medical records of all patients who underwent appendicectomy by the two surgical trainees during the study period from 1 May 1992 (when the SHO joined the firm) to 31 March 1993 (when the registrar left) were assessed. Operations carried out by locum surgeons were excluded. All patients operated on were admitted to one surgical firm and no case selection or interfirm referral took place. An emergency theatre was

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Table I. Log books of the registrar and SHO from 1 May 1992 to 31 March 1993 (laparoscopic surgery)

	Registrar				SHO			
	At	As	P	Total	At	As	P	Total
Diagnostic laparoscopy	1	1	4	6	0	4	4	8
Cholecystectomy	6	25	2	33	2	22	0	24
Appendicectomy	2	2	25	29	1	19	2	22

SHO, Senior House Officer; At, Attended; As, Assisted/Supervised; P, Performed

always available during the day and the majority of appendicectomies took place between 0800 and 2000. No laparoscopic appendicectomies were started after midnight. The duration of anaesthesia was used as an approximation of the operating time.

Basic laparoscopic surgical training by trainee surgeons at Broomfield Hospital is supervised by consultant surgeons who are proficient in laparoscopic surgery and have attended training courses in both basic and advanced laparoscopic procedures. Initially, trainee surgeons are taught basic techniques on a simulator, after which they progress to supervised hands-on training during elective surgical lists. The operations that trainees either attended, assisted at or were supervised, or performed unsupervised were recorded in their log books and on the computerised departmental audit system (Table I). After 6 months the registrar had performed sufficient supervised laparoscopic surgery to be deemed trained for undertaking unsupervised laparoscopic appendicectomy. The SHO was permitted to undertake supervised diagnostic laparoscopy.

The following guidelines were developed by the Department of Surgery at Broomfield Hospital for surgeons in training undertaking laparoscopic appendicectomy:

- 1 Patients should be over 10 years old and acute appendicitis suspected.
- 2 When the appendix looks normal and no other pathology is diagnosed, an appendicectomy is performed.
- 3 When the appendix looks normal and other pathology is diagnosed, appendicectomy is not performed as an incidental procedure.
- 4 Conversion to open appendicectomy is performed if the laparoscopic procedure cannot be completed within 1.5 h.
- 5 All trainees are required to video unsupervised operations.

The technique for laparoscopic appendicectomy at Broomfield Hospital differs slightly from that used by other units (12,13). Three non-disposable ports are inserted, a 10 mm umbilical telescope port, a 10 mm working port suprapubically in the hairline left of the midline and a 5 mm port in the right iliac fossa to manipulate and hold the appendix. The surgeon and camera assistant stand on the patient's left-hand side and

face a TV monitor directly opposite. The meso-appendix is dissected by scissors and vessels are ligaclipped. Diathermy is used sparingly. Three 0 chromic catgut endoloops are placed on the base of the appendix, after which it is divided between the most distal loop and the remaining two and delivered through the suprapubic port.

Statistical analysis

Comparison between open and laparoscopic appendicectomies was by the Mann-Whitney test for unpaired non-parametric data. All the tests were two-tailed at a level of significance of 0.05.

Results

The total number of appendicectomies performed by the registrar and SHO during the 11 month study period is illustrated in Fig. 1. The uneven monthly distribution reflects holiday and study leave. In all, 27 laparoscopic appendicectomies were undertaken by the two surgical trainees during the study period. The third attempted case was converted to open for technical reasons. The only other open appendicectomies performed after November 1992 were for age under 10 years and when the SHO was on call with other registrars due to rota alterations. From January 1993 the SHO performed a diagnostic laparoscopy before each laparoscopic appendicectomy and in March 1993 performed two laparoscopic appendicectomies assisted by the registrar.

There was no statistically significant difference in age, weight, histological diagnosis or complication rate between the patients who underwent open *versus* laparoscopic appendicectomy (Table II). The median anaesthetic time was 27.5 min shorter for open appendicectomies ($P=0.0007$), whereas patients were discharged home 1 day earlier after laparoscopic appendicectomies ($P=0.0009$). These data are displayed by a scattergram in

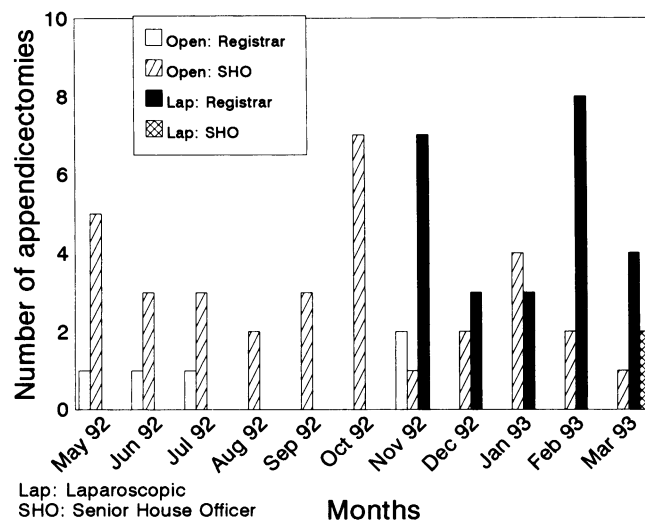


Figure 1. Total number of appendicectomies performed by the registrar and SHO by the open and laparoscopic methods during the 11 month study period.

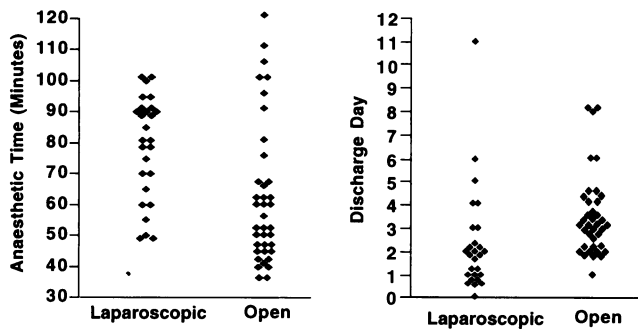


Figure 2. Anaesthetic time and discharge day of all appendicectomies performed by the registrar and SHO by the open and laparoscopic methods during the 11 month study period.

Fig. 2. Two complications arose after laparoscopic appendicectomy for suppurative appendicitis, one patient had a superficial infection around the suprapubic wound and one patient developed a pelvic abscess that resolved with antibiotics over 11 days.

No additional laparoscopic equipment or instruments were necessary for laparoscopic appendicectomy training. All appendicectomies were performed as emergency procedures, which meant staff and operating theatre time were equally available for open and laparoscopic appendicectomies. The additional cost of disposables in laparoscopic cases was balanced by a reduction in costs due to earlier discharge. Overall the laparoscopic cases cost £152 less than an open operation (Table III).

Table II. Comparison of open and laparoscopic appendicectomies (registrar and SHO)

	Laparoscopic (n=27)	Open (n=38)
Median age in years (range)	23.5 (9-65)	18 (6-77)
Median weight in kilograms (range)	60 (23-85)	60 (15-105)
Median anaesthetic time in minutes (range)	80 (50-100)	52.5 (35-120)
Operative diagnosis of acute appendicitis	23 (85%)	31 (81.5%)
Histological inflammation	26 (96.5%)	32 (84%)
Median discharge day (range)	2 (0-11)	3 (1-8)
Complications	2*	0

* Wound infection, pelvic abscess

Table III. Cost breakdown of laparoscopic versus open appendicectomies performed at Broomfield Hospital. The median and mean hospital stay was 3 days for open and 2 days for laparoscopic appendicectomies

	Open	Laparoscopic
Consultant episode (£240/day)	£720	£480
Theatre costs (disposables)	£ 50	£138
Total cost per case	£770	£618

Discussion

Operative surgery is a craft that has to be learned from teachers and books, but perfection comes only through practice. Close supervision of practical training is required to ensure minimal patient morbidity. Laparoscopic surgery has brought a new dimension to general surgical training by having the detail of every operation displayed on a large TV monitor for both surgeon and assistants. The operation can also be recorded on video for later teaching and criticism. Learning an operation by laparoscopy may aid a surgeon when subsequently performing it by the open method. Most general surgeons today are required to be able to perform laparoscopic cholecystectomy and the requirements in 5 years' time may well be more demanding (14). It is therefore essential that basic laparoscopic techniques are introduced early in surgical training, together with other essential techniques such as instrument and tissue handling, knot tying and anastomoses.

The introduction of laparoscopic appendicectomy on this surgical firm initially resulted in the SHO doing fewer appendicectomies, but it also resulted in earlier training in diagnostic laparoscopy and laparoscopic surgery. During the second training year the SHO can perform most of the laparoscopic appendicectomies supervised while the registrar undertakes more advanced training. The gradual acquisition of laparoscopic skills parallels that of traditional open surgical training.

This paper describes the introduction of laparoscopic surgery to a DGH surgical firm before the establishment of official College guidelines and Government-funded training centres. These centres will offer simulated training exercises and the opportunity to observe experts operating live. In contrast to Europe and the USA, current legislation prevents the use of live animals. The majority of UK surgical trainees are still likely to gain their initial operative experience in a clinical setting. The results of this study indicate that basic laparoscopic surgical training of junior surgeons can be undertaken safely and successfully in a district general hospital. Laparoscopic appendicectomy is a suitable procedure to be undertaken after initial training since it is both safe and cost-effective. The outcome of laparoscopic appendicectomies at Broomfield Hospital are closely audited with regard to histological diagnosis, operating time, time in hospital, complications and cost. To date the results compare favourably with open appendicectomy.

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