

# Comparison Of Laparoscopic Vs Open Appendectomy In A Low-Volume General Hospital. A Pilot Study

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## Citation

E Kotidis, S Parpoudi, P Karioti, N Giatas, A Tsiaousidou, E Oloktsidou, G Fotiou. *Comparison Of Laparoscopic Vs Open Appendectomy In A Low-Volume General Hospital. A Pilot Study*. The Internet Journal of Surgery. 2010 Volume 27 Number 1.

## Abstract

**Introduction:** Laparoscopy is a safe procedure for diagnostic and therapeutic purposes in patients with suspected acute appendicitis. Nevertheless, the optimal approach in a low-volume hospital is still under debate.

**Aim:** In this pilot study we are testing the laparoscopic approach against the traditional open technique in terms of postoperative pain, gastrointestinal quality of life and return to normal physical activities. **Patients - Methods:** Forty patients with right iliac fossa pain were randomised into two groups after written informed consent. Group A consisted of 20 patients who underwent laparoscopy and laparoscopic appendectomy. Group B included 20 patients submitted to open appendectomy by the same single surgeon. The postoperative pain (Numeric Rating Scale 1-10), the need for analgesics (number of tramadol 100mg doses) and the functional status (climbing stairs and mounting a bed – 1 = no difficulty, 2 = moderate difficulty and 3 = severe difficulty) were measured at days 1, 2 and 7 after the operation. The presence of bowel sounds was also checked 6, 12, 24 and 48 hours postoperatively. **Results:** The two groups were comparable in age and gender. There was no significant difference in the operative time ( $p = 0.666$ ), postoperative pain on day 1 ( $p = 0.113$ ) and function score. Group A had significantly less pain on days 2 and 7 ( $p = 0.014$  and  $p < 0.001$ , respectively), less need for opioids ( $p = 0.05$ ), earlier bowel mobilisation ( $p = 0.006$ ) and shorter hospital stay ( $p = 0.014$ ). **Conclusions:** Laparoscopic appendectomy in a low-volume district hospital is a safe operation if performed by experienced surgeons. With the limitations of the small samples size, laparoscopic approach was superior to open in terms of postoperative pain, need for analgesics, bowel mobilisation and hospital stay.

## INTRODUCTION

Acute appendicitis is worldwide one of the commonest indications for emergency abdominal surgery. Since the days of McBurney who devised muscle splitting incision for appendectomy in 1889, open appendectomy with all its modifications has been the golden standard for the treatment of acute appendicitis (1). Nevertheless, with the evolution of laparoscopy and after Kurt Semm (2), a German gynecologist, performed the first laparoscopic appendectomy in 1983, many surgeons have started to favor the minimally invasive approach (3,4). A recent Cochrane meta-analysis of randomized control trials has recommended laparoscopy and laparoscopic appendectomy as being superior to the open technique in terms of postoperative pain, complication rate, hospital stay and return to normal activities (5). However, despite the breadth of data and the widespread adoption of the laparoscopic technique, there continues to be controversy

regarding the advantages of this approach, since other studies have failed to prove the benefit of the minimally invasive technique (6). The aim of this pilot study is to test the safety and the effectiveness of laparoscopic appendectomy for acute appendicitis, in a low-volume district hospital, by comparing it with the standard open technique.

## MATERIALS – METHODS

Between August 2009 and March 2010, 49 patients with right iliac fossa pain (19 males and 30 females) were treated in our department and randomized into 2 groups. Group A consisted of 26 patients who were submitted to laparoscopy. Six of them proved to have pathology other than acute appendicitis and were excluded from the study. The remaining 20 patients underwent laparoscopic appendectomy (LA). Group B consisted of 23 patients who underwent the standard open appendectomy (OA). Three

of them had other pathology and were excluded from the study. Consequently, each group consisted of 20 patients.

Regarding the operative technique, open appendectomy was performed with the standard McBurney or Lanz muscle splitting incision. In the laparoscopic group, pneumoperitoneum was established with Hasson’s technique and the appendectomy was performed with the standard three-trocar technique. All surgical wounds were infiltrated with local anesthetic (chirocaine 0.25mg/ml). In all cases, the operative time, the total need for analgesics, the hospital stay and the complications were documented. On days 1, 2, and 3 after the operation, an independent observer, a staff nurse, was monitoring the postoperative pain using the Numeric Rating Scale from 1 to 10 (7). Similarly, on days 1, 2 and 7, the same staff nurse evaluated the physical activity by estimating the patient’s ability to climb stairs, mount a bed and squat. The score was 1 for no difficulty, 2 for moderate difficulty and 3 for severe difficulty. Therefore the total function score ranged from 3 to 9. Presence of bowel sounds was also checked by a doctor 12, 24 and 48 hours after the operation.

All parameters were expressed as Mean ±SD. Mann Whitney U test was used to check for differences between the two groups in age, body mass index, operative time, postoperative pain, dose of analgesics, function score and total hospital stay and  $\chi^2$  test to check for differences in sex distribution, bowel motility and complication rate. The level of statistical significance was defined as  $p < 0.05$ . Statistical analysis was performed using the SPSS 15 package for windows.

**RESULTS**

The two groups were comparable in age, sex distribution and body mass index (table 1). Table 2 summarizes the operative findings. It is very interesting that in a few cases of the laparoscopic group, the diagnosis would probably not be set without the aid of laparoscopy. All laparoscopic operations were performed by the same single surgeon who had already adequate experience in laparoscopic surgery. There was no conversion to open, although the laparoscopic group included two cases with peritonitis secondary to perforated appendix. In these cases the laparoscopic appendectomy was followed by thorough lavage of the abdominal cavity with at least 5 liters of normal saline.

There was no significant difference in the operative time between the two groups. The postoperative pain was similar on day 1 ( $p=0.113$ ) but significantly less in group A on days

2 and 3 ( $p=0.014$  and  $p < 0.001$ , respectively). Likewise, the total need for analgesics was less in group A ( $p=0.05$ ). The functional status was similar on day 1 ( $p=0.165$ ) but significantly better in the laparoscopic group on days 2 and 7 ( $p=0.008$  and  $p=0.006$ , respectively). Bowel motility was evident in all patients in group A 12 hours after the operation but only in 50% of the patients in group B. The total hospital stay was also shorter in the laparoscopic group ( $p=0.0114$ ). Finally, no difference was found in the complication rate between the two groups. Table 3 summarizes the results of the statistical analysis and figure 1 illustrates in boxplot graphics the difference between the two groups in terms of postoperative pain and functional status.

**Figure 1**

Table 1. Preoperative characteristics

		LA	OA	P value
Gender	Males	7	9	0.602
	Females	13	11	
Age		29.2±11.3	37.2±19.8	0.546
BMI (kg/m2)		28.5±6.3	27±5.7	0.478

**Figure 2**

Table 2. Operative findings

	LA	OA
Acute appendicitis	15	17
Gangrenous appendicitis	3	2
Perforated appendix – peritonitis	2	1
Adnexal infection	2	-
Retrograde menstruation	2	2
Crohn's disease	-	1
Internal paracecal strangulated hernia	1	-
Torsion of epiploic appendage of the ascending colon	1	-
Total	26	23

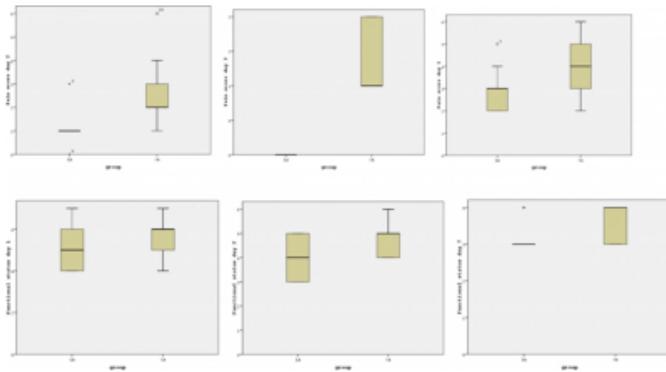
Figure 3

Table 3. Results of statistical analysis

		LA (n=20)	OA (n=20)	P value
Operative time (min)		44±8	40±11	0.66
Postop. Pain	Day 1	2.9±1.1	4±1.5	0.113
	Day 2	1.1±0.8	2.7±1.6	0.014
	Day 3	0.0±0.0	1.3±0.5	<0.001
Need for analgesics		1.7±0.9	1.8±1	0.05
Functional status	Day 1	5.2±1.0	5.7±0.9	0.165
	Day 2	4.0±0.8	4.8±0.6	0.008
	Day 7	3.2±0.4	3.7±0.5	0.006
Presense of bowel sounds	12h	100%	50%	0.012
	24h	100%	80%	0.14
	48h	100%	100%	1
Hospital stay		1±0.6	1.2±0.4	0.014
Complication rate		10%**	15%*	0.74
* 3 patients with wound infection				
** 2 patients with small intraabdominal abscess				

Figure 4

Figure 1. Boxplot graphics illustrating the difference between the two groups in terms of postoperative pain and functional status.



DISCUSSION

Since its conception, the popularity of the laparoscopic approach to appendectomy has increased, although with reservation on the part of some surgeons. The initial failure to demonstrate clear patient benefits (6) combined with the longstanding existence of a simple, safe, and effective open approach, has led to slow uptake of the laparoscopic approach and continued debate over its use. The uptake is even slower in small, low-volume hospitals where both patients and surgeons are more reluctant to change their practice. This study was designed to check the safety and effectiveness of laparoscopic appendectomy in a small district hospital, comparing it with the standard open technique. Should laparoscopic appendectomy be performed only in high volume hospitals with experienced personnel? Is it safe to perform this operation in an environment where the personnel have limited experience in

laparoscopic surgery?

The results of our trial demonstrated a clear superiority of the laparoscopic versus the open technique regarding the post operative pain, the functional status of the patient after the procedure, the duration of hospital stay and the complication rate. In addition, no significant increase in the operative time was noticed. Another parameter, not encountered in this study is the cost of laparoscopic appendectomy. In our material, the procedure was carried out with the use of non-disposable instruments. The mesoappendix was divided with hook diathermy and the base of the appendix was ligated with plane ties. Therefore, the cost was limited to just the essentials to establish the pneumoperitoneum.

A particular problem with laparoscopic appendectomy is the differing experience of surgeons performing this operating procedure. Several studies (8,9) have proved that appendectomy is an ideal operation for the introduction of general surgery trainees in laparoscopic surgery. Things might be more difficult in complicated cases. But, as surgical expertise increases with the number of operations, a surgeon who routinely performs appendectomy laparoscopically will more likely be able to handle complicated appendectomies in the same manner.

In conclusion, laparoscopic appendectomy is safe and effective in the treatment of acute appendicitis even in low-volume hospitals that did not routinely perform this operation. Many of the initial factors leading to concern over the use of laparoscopy are now being addressed, probably due to the routine acceptance of laparoscopic surgery and increased training of juniors in laparoscopic surgical techniques.

References

1. Rintoul RF: Operation on the Appendix. In Farquharson's Text Book of operative surgery. Eighth Edition (1995), Publisher Churchill Livingstone; pp 452-54.
2. Semm K: Endoscopic appendectomy. Endoscopy; 1983; 15: 59-64.
3. Moberg AC, Berndsen F, Palmquist I, Petersson U, Resch T, Montgomery A: Randomized clinical trial of laparoscopic versus open appendectomy for confirmed appendicitis. Br J Surg; 2005; 92: 298-304.
4. Ignacio RC, Burke R, Spencer D, Bissell C, Dorsainvil C, Lucha PA: Laparoscopic versus open appendectomy: what is the real difference? Results of a prospective randomized double-blinded trial. Surg Endosc; 2004; 18: 334-337.
5. Sauerland S, Lefering R, Neugebauer EA: Laparoscopic versus open surgery for suspected appendicitis. Cochrane Database Syst Rev; 2004; (4)CD001546.
6. Tate JJ, Dawson JW, Chung SC, LauWY, Li AK: Laparoscopic versus open appendectomy: prospective

randomised trial. Lancet; 1993; 342: 633-637.

7. Katz J, Melzack R: Measurement of pain. Surg Clin North Am; 1999; 79: 231-252.

8. Tata MD, Singh R, Bakar AA, Selvindoss P, P K, Gurunathan R: Laparoscopic appendectomy: the ideal

procedure for laparoscopic skill training for surgical registrars. Asian J Surg; 2008; 31(2): 55-8.

9. Duff SE, Dixon AR: Laparoscopic appendectomy: safe and useful for training. Ann R Coll Surg Engl; 2000; 82(6): 388-91.

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