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

E Kotidis, S Parpoudi, P Karioti, N Giatas, A Tsiaousidou, E Oloktsidou, G Fotiou

Citation

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 appendicectomy. Group B included 20 patients submitted to open appendicectomy 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 appendicectomy 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 appendicectomy in 1889, open appendicectomy 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 appendicectomy 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 appendicectomy 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 appendicectomy 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 appendicectomy (LA). Group B consisted of 23 patients who underwent the standard open appendicectomy (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 appendicectomy was performed with the standard McBurney or Lanz muscle splitting incision. In the laparoscopic group, pneumoperitoneum was established with Hasson’s technique and the appendicectomy 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 χ² 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 appendicectomy 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

<table>
<thead>
<tr>
<th>Gender</th>
<th>LA</th>
<th>OA</th>
<th>P value</th>
</tr>
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<tbody>
<tr>
<td>Male</td>
<td>7</td>
<td>9</td>
<td>0.602</td>
</tr>
<tr>
<td>Female</td>
<td>13</td>
<td>11</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Mean ±SD</th>
<th>LA</th>
<th>OA</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>29.2±11.3</td>
<td>32.7±19.8</td>
<td>0.546</td>
<td></td>
</tr>
<tr>
<td></td>
<td>28.5±6.3</td>
<td>27±6.7</td>
<td>0.478</td>
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</tr>
</tbody>
</table>

Figure 2
Table 2. Operative findings
Comparison Of Laparoscopic Vs Open Appendicectomy In A Low-Volume General Hospital. A Pilot Study

Figure 3
Table 3. Results of statistical analysis

<table>
<thead>
<tr>
<th></th>
<th>LA (n=20)</th>
<th>OA (n=20)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative time (min)</td>
<td>41±8</td>
<td>40±11</td>
<td>0.66</td>
</tr>
<tr>
<td>Postop. Pain</td>
<td>2.9±1.1</td>
<td>4±1.5</td>
<td>0.113</td>
</tr>
<tr>
<td>Day 1</td>
<td>1.7±0.9</td>
<td>2±0.9</td>
<td>0.064</td>
</tr>
<tr>
<td>Day 2</td>
<td>3.2±0.9</td>
<td>3.7±0.9</td>
<td>0.003</td>
</tr>
<tr>
<td>Need for analgesics</td>
<td>1.7±0.9</td>
<td>1.8±0.9</td>
<td>0.85</td>
</tr>
<tr>
<td>Functional status</td>
<td>7±1.8</td>
<td>8±2.5</td>
<td>0.015</td>
</tr>
<tr>
<td>Presure of bowel sounds</td>
<td>7±3.4</td>
<td>9±4.9</td>
<td>0.018</td>
</tr>
<tr>
<td>Hospital stay</td>
<td>14±0.6</td>
<td>14±1.3</td>
<td>0.916</td>
</tr>
</tbody>
</table>

* 1 patients with wound infection
** 7 patients with minor 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 appendicectomy 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 were both patients and surgeons are more reluctant to change their practice. This study was designed to check the safety and effectiveness of laparoscopic appendicectomy in a small district hospital, comparing it with the standard open technique. Should laparoscopic appendicectomy 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 appendicectomy. In our material, the procedure was carried out with the use of non-disposable instruments. The mesappendix 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 appendicectomy is the differing experience of surgeons performing this operating procedure. Several studies (8,9) have proved that appendicectomy is an ideal operation for the introduction of general surgery trainees in laparoscopic surgery. Things might be more difficult in complicates cases. But, as surgical expertise increases with the number of operations, a surgeon who routinely performs appendicectomy laparoscopically will more likely be able to handle complicated appendicectomies in the same manner.

In conclusion, laparoscopic appendicectomy 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
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Author Information

Efstathios Kotidis, MSc PhD
Department of General Surgery, Katerini General Hospital

Styliani Parpoudi
Department of General Surgery, Katerini General Hospital

Paraskevi Karioti
Department of General Surgery, Katerini General Hospital

Nikolaos Giatas
Department of General Surgery, Katerini General Hospital

Anastasia Tsiaousidou
Department of General Surgery, Katerini General Hospital

Eirini Oloktsidou
Department of General Surgery, Katerini General Hospital

Georgios Fotiou
Department of General Surgery, Katerini General Hospital