The use of diagnostic laparoscopy in patients with suspected appendicitis
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Chapter 5

A normal appendix found during diagnostic laparoscopy should not be removed

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ABSTRACT

Background: Diagnostic laparoscopy has been introduced as a new diagnostic tool for suspected appendicitis. While the normal appendix used to be removed routinely, laparoscopy allows us leaving a normal appearing appendix in place. This latter strategy is, however, not generally accepted. Therefore the long-term results of not removing a normal appearing appendix are evaluated.

Methods: Prospective evaluation of 109 diagnostic laparoscopies for suspected appendicitis in which a normal appearing appendix was left in place. After a median follow up time of 4.4 years a questionnaire by telephone was performed.

Results: There were no false negative laparoscopies. In 65 (60%) patients another diagnosis was obtained (group I). In 44 (40%) patients no diagnosis was obtained (group II). After a median interval of 8 months, 15 patients were presented at the emergency department for symptoms possibly involving the appendix, during the median follow up of 4.4 years. This resulted in 9 re-admissions (6 patients group I, 3 patients group II). From these patients 8 patients were re-operated. Only in one (0.9%) patient a histologically proven appendicitis was removed. 105 patients were eligible for follow up. From the 100 (95%) interviewed patients, 9 (9%) patients (6 patients group I, 3 patients group II) still had recurrent pain in the right lower abdominal quadrant. There were no differences between patients with or without another diagnosis obtained during preceding laparoscopy.

Conclusion: It is safe and probably better to leave a normal appearing appendix in place when a diagnostic laparoscopy for suspected appendicitis is performed even if another diagnosis cannot be found at laparoscopy.

INTRODUCTION

The diagnosis appendicitis remains difficult. Clinical criteria used in the diagnosis appendicitis lead to 15-30% of normal appendices being removed at open operation. New diagnostic tools such as ultrasonography and CT scan have been introduced and achieve sensitivity rates of 75 to 89% and specificity rates of 86 to 100% for the diagnosis appendicitis. In the "laparoscopic era", diagnostic laparoscopy has also been used because it is usually a simple procedure with a high specificity and has the possibility of obtaining other, in particular gynaecological, diagnoses. In the "open" era, the normal looking appendix found during exploration has been removed routinely because the presence of the typical scar in the right lower abdominal quadrant might cause confusion about the diagnosis in the future. After introduction of diagnostic laparoscopy it has been suggested to leave a normal looking appendix in place, even if another diagnosis is not found. Others report that a normal looking appendix found during laparoscopy can safely be removed because this does not increase post-operative morbidity or hospital stay. Furthermore the presence of an "endo-appendicitis", which might not be recognized during laparoscopy and could be equally missed at open operation, could lead to recurrent abdominal complaints and subsequent appendectomy. This should justify the removal of a normal appearing
appendix \(^{15,16}\). On the other hand, besides a prolonged operation time and costs, an increased number of complications after removal of a normal appendix have been reported \(^{17-20}\). Though rarely, a normal appendix might also be useful in future reconstructive urological operations \(^{21}\). Considering the above mentioned aspects we decided not to remove a normal appearing appendix found during laparoscopy for suspected appendicitis. This study was initiated to evaluate the long-term results of this strategy.

**PATIENTS AND METHODS**

*Initial assessment:*  
The study was performed in the Medical Center Alkmaar, the Netherlands, a 900 beds regional teaching hospital. Consecutive patients referred to the hospital by general practitioners for suspected appendicitis were prospectively evaluated in the period 1994 – 1997.

*Operative strategy:*  
Diagnostic laparoscopy was performed in a selective group of patients: when there was doubt of the clinical diagnosis appendicitis. Prior to laparoscopy, 500 mg Metronidazole was given intravenously. The appendix was only removed if appendicitis was confirmed during laparoscopy or when the appendix could not be clearly interpreted. A normal appearing appendix was left in place even when no other explanation for the presenting abdominal symptoms could be found.

*Follow up:*  
Patients were evaluated in the outpatient clinic six weeks after operation. Re-admission, re-operation or new referrals for similar symptoms were evaluated. Histological examination was performed in all patients where the appendix was removed.

In November 1999 a questionnaire by telephone was performed on all patients. Patients were asked for: remaining symptoms possibly involving the appendix, such as recurrent pain in the right lower abdominal quadrant, acute appendicitis and treatment by general practitioner or other specialists. The statistical analysis was performed with the SPSS computer program.
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RESULTS

Treatment and negative appendectomy rates:

There were 1,050 patients (531 (51%) women, 389 (37%) men and 130 (12%) children) prospectively evaluated for suspected appendicitis. From these patients 202 (19%) patients were eventually discharged without further treatment, 471 (45%) patients underwent an appendectomy by muscle-splitting incision resulting in a negative appendectomy rate of 61/471 = 13% in this group.

377 (36%) patients (252 (67%) women, 87 (22%) men and 42 (11%) children < 11 years) underwent diagnostic laparoscopy because there was doubt of the diagnosis appendicitis. From this group 268 (71%) patients underwent eventually appendectomy: 94 patients by laparoscopic appendectomy and 174 patients by muscle-splitting incision. The negative appendectomy rate in this group was 41/268 = 15%. There was one (0.3 %) complication following laparoscopy (n = 377): a superficial bleeding in an umbilical trocar opening was treated with a local suture.

Patients with a normal appendix found during laparoscopy:

In 109 (29%) patients, a normal looking appendix was found during laparoscopy and left in place. Another diagnosis was obtained in 65 (60%) patients (group I), mostly, 48 (74%) of gynaecological origin (see table 1). When needed, appropriate treatment was initiated: in 5 patients a laparoscopic adhesiolysis was performed, 3 patients with diverticulitis were treated conservatively. Gynaecologists treated 9 patients with adnexitis by antibiotics, 3 patients with ectopic pregnancy and 4 patients with a tordated adnex underwent ovariectomy. The remaining 15 patients did not receive further treatment. All patients recovered well.

In 44 (40%) patients (group II) no other diagnosis was obtained. These patients recovered uneventful without further therapy.

The median hospital stay was 2 days. The median hospital stay of patients in group I was 3 days, in group II, 2 days (not significant: $\chi^2$ test, $p=0.2$). No patients developed signs of (perforated) appendicitis in the post-operative period.
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Table 1:

Other diagnoses obtained by laparoscopy (group I):

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ovulation bleeding</td>
<td>13</td>
</tr>
<tr>
<td>Salpingitis</td>
<td>9</td>
</tr>
<tr>
<td>Ovarian cyst</td>
<td>9</td>
</tr>
<tr>
<td>Torsion of adnex</td>
<td>4</td>
</tr>
<tr>
<td>Mesenteric lymphadenitis</td>
<td>6</td>
</tr>
<tr>
<td>Retrograde menstruation</td>
<td>5</td>
</tr>
<tr>
<td>Endometriosis</td>
<td>5</td>
</tr>
<tr>
<td>Adhesions</td>
<td>5</td>
</tr>
<tr>
<td>Ectopic pregnancy</td>
<td>3</td>
</tr>
<tr>
<td>Diverticulitis</td>
<td>3</td>
</tr>
<tr>
<td>Others</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
</tr>
</tbody>
</table>

48 patients with gynaecological diagnosis

Follow up:

During follow up, 15 (14%) patients: 8 patients of group I and 7 patients of group II presented at the emergency department because of recurrent abdominal pain after a median time of 8 months. Nine of these, respectively 6 patients from group I and 3 patients from group II, were re-admitted. One patient was discharged as the symptoms disappeared without further treatment.

In group I, 2 patients were operated for suspected appendicitis; in 1 patient a laparoscopy was performed in which a normal appendix was again left in place, 1 patient underwent appendectomy. Two patients underwent an elective appendectomy for chronic pain in the right lower quadrant. All appendices removed were normal and symptoms disappeared in all patients. One patient with signs of peritonitis underwent a laparotomy in which a perforated sigmoid was found and treated.

In group II, one patient underwent an elective appendectomy for chronic pain in the right lower abdominal quadrant in which a normal appendix was removed. Symptoms remained unchanged in this patient. Two patients underwent appendectomy for suspected appendicitis, in one patient a normal appendix was found and in only one (0.9%) patient a histologically proven appendicitis was found and removed laparoscopically. There were no differences in recurrence of symptoms or treatment between group I and group II.

After a median follow-up of 4.4 years a telephonic questionnaire was performed. Three patients lived abroad, one patient died of an unrelated disease; so 105 patients were eligible for follow up. 100 (95%) patients could be contacted: 59 patients of group I and 41 patients of group II. Nine (9%) patients still had episodes of recurrent pain in the right lower abdominal quadrant: 6 patients of group I and 3 patients of group II. From the patients of group I, two patients visited for that reason their general practitioner, one patient an internist, one patient went to an emergency
department elsewhere and two patients did not see another doctor at all. In none of them another diagnosis was obtained. The 3 patients of group II visited an internist who in two times made the diagnosis Irritable Bowel Syndrome.

DISCUSSION

The present study showed that it is safe to leave a normal appearing appendix in place when a diagnostic laparoscopy is performed for suspected appendicitis, even if no other pathology is found. There were no patients who developed signs of peritonitis in the early post-operative period after laparoscopy, indicating that there were no false-negative laparoscopies. The symptoms mimicking appendicitis in the patients in which no pathology was found during laparoscopy disappeared without further treatment, therefore we assume that these symptoms were mainly due to a self-limiting disease, such as gastro-enteritis. If an entity as endo-appendicitis exists it was of no clinical importance in this study population. The endo-appendicitis was either cured by one dose of 500 mg Metronidazole given during the laparoscopy or did not need further therapy at all. Because during long-term follow up in only one (1%) patient an inflamed appendix was removed, apparently the chance of developing appendicitis is not higher than in a normal population so there can be no rational reason for a “prophylactic appendectomy”.

Symptoms disappeared in 3 of the 5 patients whose histologically normal appendix was removed during the second admission but in one patient the symptoms remained unchanged and in one patient the symptoms disappeared after the appendix was left again in place during diagnostic laparoscopy. Therefore it remains doubtful if the disappearance of symptoms of the three patients was in any way related to their appendectomy. Ninety-one (91%) of the interviewed patients were symptom free after a median follow-up period of 4.4 years. It remains uncertain whether the pain in the right lower quadrant in the remaining 9 (9%) patients was caused by the appendix. Their symptoms might also be caused by other diseases such as Irritable Bowel Syndrome.

There were no differences in recurrent symptoms or eventual treatment between the patients in which another diagnosis was made during laparoscopy and patients in which no pathology was found during laparoscopy. It seems therefore not justified to remove the normal appearing appendix only when no other pathology is found during laparoscopy as suggested previously [22]. Considering the above results, the most valid reason for removing a normal appearing appendix would be to avoid diagnostic confusion in the future in case of acute abdominal complaints. In our opinion, this does not weigh against the disadvantages of such an appendectomy as possible complications, adhesion formation leading to possible future small intestine obstruction and extra costs of (laparoscopic) equipment and histopathological examination.

Furthermore, if one would accept this latter reason, it would be a sufficient argument for a routine appendectomy during every abdominal operation.

From the present study it can be concluded that diagnostic laparoscopy for suspected appendicitis is not only a safe procedure that is helpful in obtaining other diagnoses. It also appeared that it is
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justified and even preferable to leave the appendix in place as recurrent appendicitis and the need for surgery during follow up is low.

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