Long-term Benefits of Laparoscopic Appendectomy for Chronic Abdominal Pain in Fertile Women

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Aim. To assess long-term benefit of laparoscopic appendectomy for chronic abdominal pain of unknown origin in fertile women.

Method. The study included 70 fertile women aged 29.2 ± 13.1 years who had undergone diagnostic laparoscopy for recurrent abdominal pain at our Department between 1996 and 2000. In December 2002, a questionnaire with symptom-specific questions and procedure-specific questions was sent to all the patients. The response rate was 76% (53 out of 70).

Results. According to intraoperative findings there were 8 patients with adhesions, 12 with gynecological origin of pain, 27 with chronic inflammation or narrowed lumen of the appendix, and 6 with normal laparoscopic findings and innocent appendix. The most common intervention was appendectomy, performed in 41 out of 53 cases; cyst fenestration in 10 cases; and lysis of adhesions in 8. The average hospital stay was 3.6 ± 2.6 days. Postoperative complications occurred in 10/53 patients. A serious complication involving bladder injury after lysis of adhesions occurred in a single patient. There was no mortality. 3 out of 53 patients were readmitted 1, 3, and 9 months postoperatively because of residual abdominal pain. Two of them had appendectomy. Long-term follow up showed that there were no differences in the overall satisfaction with diagnostic laparoscopy in the patients with (n = 41) and without appendectomy (n = 12). There was no difference in overall satisfaction between the patients having inflamed appendix (n = 22) and those without inflamed appendix (n = 19).

Conclusion. Diagnostic laparoscopy is a diagnostic and therapeutic option in most fertile women with chronic abdominal right iliac fossa pain of unknown origin. Our results showed low postoperative complications and no mortality rate with laparoscopic appendectomy indicate removal of appendix as a part of diagnostic laparoscopy when the origin of pain is unknown. In some cases of persistent pain, the removal of appendix is beneficial by eliminating appendicitis in differential diagnosis.

Key words: abdominal pain; adhesions; appendectomy; appendicitis; follow-up studies; laparoscopy; treatment outcome; women

Chronic abdominal pain is a frequent problem that leads to surgical interventions in fertile women (1,2). It causes a wide variety of symptoms and results in absenteeism from school and work. Numbers of diagnostic tests like computed tomography and magnetic resonance imaging are being used but none of them are effective in establishing diagnosis (3). Diagnostic laparoscopy in these patients showed to be both an excellent diagnostic tool and therapeutic method (4,5). While some authors prefer the appendectomy during diagnostic laparoscopy as a treatment option for chronic recurrent abdominal pain (1,6), others advocate against it in cases where there are no macroscopic signs of appendicitis (7,8).

Our aim was to determine whether appendectomy during diagnostic laparoscopy in fertile women with abdominal pain had long-term benefits, irrespective of the presence of signs of appendicitis.

Patients and Methods

Patients

The study included 70 female patients (Fig. 1), with the mean age of 29.2 ± 13.1 years, who underwent diagnostic laparoscopy for chronic abdominal pain at our Department from January 1996 to December 2000. The reasons for laparoscopy were chronic or recurrent abdominal pain, defined as pain that lasted at least three months, or was a reason for repeated hospitalizations (twice or more in the previous six months), or was causing a problem that affected life quality (9). All patients were admitted to the hospital after exacerbation of the chronic pain. The patients underwent basic laboratory tests, abdominal ultrasound, and gynecological examination with vaginal ultrasound (except virgins), before the laparoscopy. Causes of abdominal pain, as iden-
We performed diagnostic laparoscopy in general endotracheal anesthesia. Verres needle (Ethicon-Endo Surgery, Cincinnati, OH, USA) and first 10-mm trocar were introduced through supraumbilical 10-mm skin incision. Through a suprapubic small incision we introduced 5-mm trocar, and 10-mm trocar in McBurney’s point. The intra-abdominal pressure was maintained at 13 mm Hg by insufflating CO₂. Then we proceeded to examine intra-abdominal cavity using a 30-degree laparoscope. After positioning a patient in Trendelenburg position for inspection of the lower part of the abdominal cavity, we inspected uterus and both adnexa. The peritoneal smear samples were taken for microbiological analysis in cases of present inflammation. The simple cyst fenestrations were performed in the patients with ovarian cysts.

Adhesiolysis was performed if adhesions with dilated intestines were found. Diagnostic laparoscopy was finished by inspection of the appendix and peri-appendicular region. Laparoscopic assisted appendectomy was performed even if appendix looked normal and other pathology was not obvious.

All patients recovered shortly after diagnostic laparoscopy, which lasted 35.0±2.3 minutes.

The patients were mobilized about 6 h after the procedure, and visual analog scale was used to assess pain. The patients did not receive any narcocanalgetics, except two 10 mL ampoules of non-steroid antirheumatics, ketoprofenum (Knavon, Pliva, Zagreb, Croatia), and in addition intravenous administration of one ampoule of 10 mL metamizolum natricum (Analgin, Pliva, Zagreb, Croatia). When necessary, the patients received antibiotics only if peritoneal inflammation had been found. Usually, we administered cefalexinum (Ceporex, Pliva, Zagreb, Croatia). When necessary, the patients received a 10-mL ampoule of ketoprofenum the next day. On the day of the operation, patients were on a liquid diet (water or tea), but the next day they were allowed solid food. The patients received antibiotics if peritoneal inflammation had been found. Usually, we administered cefalexinum (Ceporex, Pliva, Zagreb, Croatia) as a prophylactic. In four patients, the antimicrobial therapy was corrected according to the bacteriological findings. The postoperative follow-up lasted 30 days. Postoperative complications were recorded, including impaired wound healing and secretions from skin incisions.

Statistical Analysis

We used standard descriptive statistics, Mann-Whitney U-test, and chi-square test. A result was considered statistically significant if p-value was ≤0.05. All statistical procedures were performed by using Superanova and Statview statistical software packages (Abacus Concepts, Berkeley, CA, USA).
Results

Out of 70 patients, 53 answered the questionnaire. Among the responders, 12 underwent laparoscopy for gynecological origin of pain, 8 for adhesions, 27 because appendix as a source of chronic abdominal pain, and 6 for other reasons of pain (Table 2).

The patients with gynecological origin of pain were successfully treated with antibiotics, cysts fenestration, and abdominal cavity drainage. The most frequent causes of pelvic infections were Candida, Staphylococcus epidermidis, and Proteus mirabilis. Microbiological samples from the vaginal epithelia matched with the intra-abdominal samples in 7 out of 9 patients, which confirmed the ascending way of inflammation.

Intestinal adhesions in 8 patients mostly developed after previous abdominal procedures. During lysis of large adhesions in the pelvis after Cesarean section in a patient, unrecognized perforation of the bladder occurred. The next day laparotomy and closure of the bladder were performed. Patient was discharged on the eighth postoperative day without any further complications.

Twenty-two out of 27 patients with appendix as a source of pain had appendicitis, whereas 5 patients had coprolite in the appendix.

We failed to establish the correct diagnosis using diagnostic laparoscopy in 6 out of 53 patients: two patients had peptic ulcers that were diagnosed gastroscopically after diagnostic laparoscopy, one had gallstones, two patients had microbiological confirmed pelvic infection, and in one patient the reasons for pain were of psychological nature.

According to laparoscopic procedures, 41 out of 53 patients underwent diagnostic laparoscopy with appendectomy and 12 underwent diagnostic laparoscopy only (Table 3). In 5 of these 12 patients, appendectomy had been already performed, and in the rest of patients we found other pathology, such as ovarian teratoma (a single patient), ovarian cysts, or intestinal adhesions with dilated intestine as a cause of obstructions, while the appendix appeared normal.

In the group of 41 appendectomized patients, 19 showed no signs of inflammation of the appendix, the pathologist found coprolite in 5, whereas 22 had appendicitis.

There were no differences between patients with and without appendectomy concerning the procedure duration. Analyzing only appendectomized patients, we found no differences in the procedure duration according to inflammatory status of the appendix (Man-Whitney U-test, p = 0.545).

We encouraged early oral feeding to stimulate the intestinal peristaltic. The second postoperative day all patients had bowel movement, except one who required laparotomy and had bowel movement on the fifth postoperative day.

The patients were hospitalized for at least one day after procedure. Only the patient with the laparoscopic bladder lesion was hospitalized for 8 days. The mean duration of hospital stay was 3.6 ± 2.6 days.

Postoperative complications occurred in 10 out of 53 patients: 6 appendectomized and 4 undergoing laparoscopy without appendectomy (Table 3). There were no significant differences between the two groups in the frequency of postoperative complications.

Table 2. Intra-operative findings related to the source of the pain in laparoscopically examined women

<table>
<thead>
<tr>
<th>Source of the pain</th>
<th>No. of patients</th>
<th>Pathological findings</th>
<th>No. of patients</th>
<th>Macroscopically visible changes*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix</td>
<td>27</td>
<td>chronic infection</td>
<td>20</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>acute infection</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>coprolite</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Gynecological origin</td>
<td>12</td>
<td>ovarian cysts</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>endometriosis</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>teratoma</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Adhesions</td>
<td>8</td>
<td>adhesions after prior surgery</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
<td>perirectal adhesions (without prior surgery)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>peptic ulcer</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>pelvic inflammation</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>gallstones</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>psychological problems</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Diagnostic laparoscopy</td>
<td>53</td>
<td></td>
<td>29</td>
<td></td>
</tr>
</tbody>
</table>

*Inflammation, cyst, adhesions, or tumor.

Table 3. Diagnostic laparoscopy results according to appendectomy

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Diagnostic laparoscopy (N=53)</th>
<th>with appendectomy (n=41)</th>
<th>without appendectomy (n=12)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure duration (min.)</td>
<td>34.8 ± 2.4</td>
<td>35.0 ± 2.4</td>
<td>35.4 ± 2.4</td>
<td>0.580*</td>
</tr>
<tr>
<td>Hospital stay (days)</td>
<td>4.0 ± 2.6</td>
<td>3.5 ± 2.5</td>
<td>3.4 ± 2.8</td>
<td>0.823*</td>
</tr>
<tr>
<td>Complications (No. of patients)</td>
<td>3 (2 wound infection, 1 trombophlebitis)</td>
<td>3 (wound infection)</td>
<td>4 (3 wound infection, 1 injured bladder)</td>
<td>0.240*</td>
</tr>
<tr>
<td>Readmission (No. of patients)</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0.544*</td>
</tr>
<tr>
<td>Satisfaction with procedure (1-5 points)</td>
<td>5.0 ± 0.2</td>
<td>4.9 ± 0.4</td>
<td>4.8 ± 0.6</td>
<td>0.690*</td>
</tr>
<tr>
<td>Overall satisfaction with procedure (8-40 points)</td>
<td>37.8 ± 3.2</td>
<td>37.3 ± 2.6</td>
<td>35.3 ± 4.4</td>
<td>0.078*</td>
</tr>
<tr>
<td>Cosmetic satisfaction (1-5 points)</td>
<td>4.5 ± 0.7</td>
<td>4.0 ± 0.7</td>
<td>4.4 ± 0.7</td>
<td>0.450*</td>
</tr>
<tr>
<td>Procedure duration (min.)</td>
<td>34.8 ± 2.4</td>
<td>35.0 ± 2.4</td>
<td>35.4 ± 2.4</td>
<td>0.580*</td>
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<td>0.823*</td>
</tr>
</tbody>
</table>

*Man-Whitney U-test.  
†Chi-square test.  
‡Fisher’s exact test.
tions. Most frequently, complications occurred due to wound secretion from McBurney’s skin incision in 4 patients, from other sites of skin incisions in 5, and superficial thrombophlebitis in one. Serious postoperative complication occurred in a single patient with bladder injury during adhesion lysis.

Diagnostic accuracy of laparoscopy was 89%, because in 6 out of 53 patients we were unable to establish correct diagnosis. The cure rate was 94%, with three patients readmitted.

There were no lethal outcomes because of a small number of serious complications and because the patients were otherwise healthy women.

**Long-term Follow-up**

We received 53 out of 70 questionnaires from our patients with the mean follow-up of 43.2 ± 18.2 months. Three out of 53 patients were readmitted after 1, 3, and 9 months because of residual abdominal pain in almost the same location and of similar intensity. In two of them appendectomy was performed, whereas in the third patient, who had already been appendectomized a few year earlier, ovarian cysts had been fenestrated at the time of diagnostic laparoscopy. The latter patient was transferred to the gynecological ward because of a gynecological infection. One patient with appendectomy had enteroctilosis, and one year after appendectomy she had laparoscopic gallbladder removal performed because of calculi. The third patient was a 15-year-old girl readmitted one month after appendectomy with similar symptoms. We performed the second diagnostic laparoscopy and found no pathological substrate in the abdominal cavity. This patient was sent for psychological examination and after psychological therapy had no additional admissions or abdominal pain problem. There were no differences between the group of patients with or without appendectomy according to rehospitalization rate (chi-square test, p = 0.670).

**Questionnaire Results**

Overall satisfaction with diagnostic laparoscopy of 41 patients who underwent appendectomy was 37.6 ± 2.9 points out of a maximum 40. Twelve patients in the non-appendectomized group had a slightly lower score, 35.3 ± 4.4. Differences between the two groups did not reach statistical significance. Patients in both groups considered diagnostic laparoscopy beneficial (4.87 ± 0.39), although they were less satisfied with a cosmetic result (4.26 ± 0.71). There were no differences between the patients who underwent appendectomy and those who did not.

The long-term results revealed no differences in the satisfaction with diagnostic laparoscopy between patients with (22 out of 41) or without appendicitis (19 out of 41) (t-test, p = 0.380). Patients gave highest scores for early postoperative physical activity (Table 1).

**Discussion**

Our results showed that patients with laparoscopic appendectomy had similar long-term results to patients without appendectomy. Our long-term results also showed that the therapeutic results were similar whether the removed appendix was normal or pathologically changed.

Duration of the procedure, hospital stay, complications rate, cosmetic results, and overall satisfaction with diagnostic laparoscopy did not differ between the patients with and without appendectomy.

Diagnostic laparoscopy as a therapeutic approach to the treatment of intra-abdominal pain in women of fertile age is usually successful in over 95% of the cases (3,6,10-12). Our results were in accordance with these observations, and conversion to open procedure was not needed in any of the patients. One patient with injured bladder required laparotomy the next day because of peritonitis.

Data related to appendectomy in the cases of macroscopically innocent appendix in a patient with chronic abdominal right iliac fossa pain is still controversial. Some researchers suggest appendectomy because of low postoperative complication and mortality rate and because of relieving symptoms in most cases no matter if appendix looks normal (1,2,6). Other authors suggest leaving normal appendix (7,8,13), because they believe that the majority of cases can be cured without appendectomy, and they believe that appendectomy patients have higher complications rate.

Our experience shows that appendectomy should be performed even though there is no macroscopically visible reason because of the intraluminal changes in the appendix. The complication rate in our study was minimal. There was no mortality, and we achieved high cure rate on a long-term basis by removing the appendix.

Our study also showed that diagnostic laparoscopy was a very accurate diagnostic method. Only six patients were left without correct diagnosis, which is an excellent result if we compare it with advanced imaging methods, such as computerized tomography or magnetic resonance imaging, which are considered insufficient, time consuming, and expensive for patients suffering from chronic abdominal pain (3,14).

Diagnostic laparoscopy is the most accurate method for establishing gynecological disorders, the most frequent being ovarian cysts, followed by endometriosis, tumors, and adhesions (15,16). Our findings confirmed published data showing that laparoscopic adhesion lysis is a very accurate method with a high cure rate (17-19).

Precautions during laparoscopic adhesion lysis are needed because of the possible lesions to neighboring organs, as it happened in our patient with bladder lesion. To prevent this complication, it is important to have urine drainage with catheter or preoperative ultrasound (USG) checking for residual urine in bladder (20).

In our study, rehospitalization was needed in three patients requiring additional diagnostic procedures. The benefit of diagnostic laparoscopy in our study was 94%, which is more than the range of 73-92% reported in other similar studies (2,4,5,10,16,21). The accuracy of diagnostic laparoscopy in our
Patients was 89%, whereas in other studies it ranged between 27% and 92% (2,4,5,10,16,21).

The limitations of our study were the small number of patients and difference in the follow-up period ranging from 2 to 6 years.

We may conclude that diagnostic laparoscopy seems to be a safe diagnostic and therapeutic method in the management of fertile female patients with chronic pain in the right iliac fossa, allowing excellent visualization of the entire abdominal cavity with benefits of minimal invasive access. Laparoscopic appendectomy has no adverse effect and can be used even in cases of macroscopically innocent appendix.

References


Received: May 7, 2003
Accepted: March 10, 2004

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