

Laparoscopic appendectomy in patients with endometriosis

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KEYWORDS:

Endometriosis;
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Abstract

STUDY OBJECTIVE: To report the frequency and spectrum of histologically proved diseases of the appendix in patients undergoing laparoscopic surgery for chronic pelvic pain in conjunction with endometriosis in a tertiary referral center.

DESIGN: Patient database with retrospective chart review (Canadian Task Force classification II-3).

SETTING: University ambulatory endoscopic surgery center—tertiary referral center.

PATIENTS: Two hundred thirty-one women.

INTERVENTIONS: Appendectomy during laparoscopic surgery for endometriosis.

MEASUREMENTS AND MAIN RESULTS: We reviewed the medical records of 231 patients who underwent appendectomy during laparoscopic treatment of endometriosis performed from January 1994 through July 2004. Of the 231 patients with pelvic endometriosis, concomitant appendiceal pathology was present in 115.

CONCLUSION: The appendix may be involved and may contribute to pelvic pain in patients with endometriosis.

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Chronic pelvic pain (CPP) accounts for 10% of all gynecologic office visits and approximately 50% of all gynecologic laparoscopies.^{1,2} Although the number of disorders that may be associated with CPP is large, in clinical practice, endometriosis, adhesions, irritable bowel syndrome, and interstitial cystitis are the diagnoses made most frequently.³ Endometriosis-associated pelvic pain can be treated medically or surgically. Laparoscopic surgical treatment is particularly popular, as it can be done at the time of diagnostic laparoscopy.³ During laparoscopy, the assumption that CPP is solely a result of pelvic endometriosis may

be erroneous. Among other etiologies, appendiceal disease is often a possibility and should be considered in the differential diagnosis.⁴

To the best of our knowledge, there are sparse data that specifically evaluate the diseases of the appendix in women with endometriosis and CPP without solely right lower quadrant (RLQ) pain. In this study, we report our experience with the frequency and spectrum of histologically proved diseases of the appendix in patients undergoing laparoscopic surgery for CPP and endometriosis.

Materials and methods

We reviewed the medical records of 231 patients who underwent appendectomy during laparoscopic treatment of endometriosis performed from January 1994 through July

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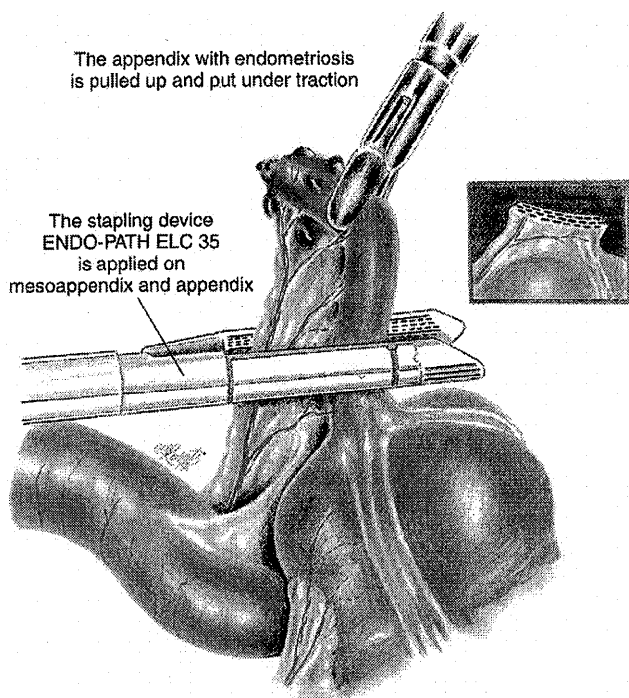


Figure 1 Application of Endo-cutter with vascular staples in order to amputate the appendix (inset showing the appendiceal stump evaluated for evidence of any leakage).

2004. Institutional review board approval was not obtained, given that this study was based on a retrospective chart review. All patients had a history of CPP, defined as continuous or intermittent pelvic pain of 6 or more months' duration. The recorded data included patient demographics, length of time the pelvic pain had been present, results of the patient's abdominal-pelvic examination, and laboratory studies performed. Intraoperative findings and complications also were identified. Postoperative data included the length of hospital stay and length of follow-up.

Preoperative investigations when necessary included ultrasound, computerized tomography, magnetic resonance imaging, cystoscopy, radiographic studies of the small bowel and colon, and/or colonoscopy. Patients with other pathology that could be the cause of chronic abdominal-pelvic pain, patients having solely RLQ pain, and patients with apparent clinical signs of acute appendicitis were excluded from the analysis.

All procedures were done under general anesthesia, and all the appendectomies were performed by the senior authors CN and CHN. Each patient was given a single preoperative dose of intravenous antibiotic. On completion of thorough laparoscopic abdominal-pelvic examination, appendectomy was performed. The appendix was removed if it appeared abnormal defined as presence of appendiceal adhesions, rigidity, hyperemia, congestion, induration, implants of endometriosis, etc. Preparation for the appendectomy included inserting grasping forceps through the RLQ trocar sleeve, and passing the bipolar electrocoagulator and the suction irrigator through the midline and lower left

quadrant ports, respectively. Then, the appendix was mobilized and examined after lysis of periappendiceal or pericecal adhesions when necessary. The bipolar coagulator and a cutting modality (scissors, laser, harmonic scalpel, etc.) were used to skeletonize, coagulate, and cut the mesoappendix. The Endo-cutter with vascular staples was used to amputate the appendix leaving a 3- to 5-mm appendiceal stump that was copiously irrigated with Ringer's lactate solution and evaluated for evidence of leakage (Figure 1). The appendix, which was subsequently sent for histopathologic examination, was removed from the abdomen either through the operating channel of the laparoscope or through the suprapubic port. Given the potential for contamination of the appendiceal grasper, it was removed from the surgical field. By reducing the pressure of the pneumoperitoneum, the appendiceal stump and the operative sites were evaluated for hemostasis.^{5,6} The appendectomy was most commonly performed in 3 to 7 minutes. Postoperative instructions were routine for gynecologic procedures, and all patients resumed a regular diet within 24 hours after surgery.

Results

Two hundred thirty-one patients were evaluated. The mean age was 34.3 years (range of 15 to 63 years). Characteristics of the patients are summarized in Table 1. Pelvic endometriosis was documented in all patients. There were no intraoperative complications. All patients were discharged from the hospital within 24 hours of surgery.

Of the 231 patients with pelvic endometriosis, concomitant appendiceal pathology was found in 115. Table 2 shows the results of the pathologic review of the resected specimens in these patients. Notably, of the 231 patients with pelvic endometriosis, 51 (22.1%) had histologic evidence of appendiceal endometriosis. Pathology other than endometriosis was found in 64 (27.7%) of all patients.

None of the patients were lost to follow-up. The mean follow-up time was 8 months. There were no major postoperative complications. Of note, on day 4, one patient had mild periumbilical ecchymosis; on day 9, one patient had umbilical wound cellulitis, and on day 20, one patient experienced nonspecific abdominal discomfort that resolved spontaneously.

Table 1 Characteristics of the patients who underwent surgery for endometriosis and chronic pelvic pain

Characteristic	N = 231
Mean age in yrs (range)	34.3 (15-63)
Mean gravidity (range)	1.3 (0-9)
Mean parity (range)	0.4 (0-3)
Mean hospitalization (hrs)	14
Abnormal appendiceal histopathology (%)	49.8

Table 2 Abnormal appendiceal histopathology results

Pathology	No. (%) (N = 115)
Endometriosis	51 (44.3)
Fibrous obliteration	27 (23.5)
Serosal adhesions	16 (13.9)
Chronic appendicitis	7 (6.1)
Endosalpingiosis	5 (4.3)
Carcinoid tumor	4 (3.5)
Acute appendicitis	2 (1.9)
Lymphoid hyperplasia	1 (0.7)
<i>Enterobius vermicularis</i>	1 (0.7)
Foreign body granuloma	1 (0.7)

Discussion

Laparoscopy plays a critical role in the diagnostic work-up of patients with CPP, especially in patients with nonspecific clinical or radiologic findings. Diagnostic laparoscopy can be helpful in ruling out endometriosis. In addition to the excellent exposure of the pelvic cavity, it allows a thorough examination of the abdominal cavity.⁷ Endometriosis traditionally has been included in the differential diagnosis of CPP, particularly in women of reproductive age.⁸ In one study, endometriosis was documented in up to 80% of patients undergoing laparoscopic surgery for CPP.⁹ However, in patients with endometriosis, the assumption that CPP is solely a result of pelvic endometriosis can be flawed. Among other disorders, appendiceal pathology also should be considered.⁴ Reports evaluating gastrointestinal endometriosis suggest that the appendix is the second most common site of involvement, with only the rectosigmoid colon being more commonly affected.^{10,11} This study evaluated appendiceal pathology in women with endometriosis and CPP without solely RLQ pain.

We have been able to find only one study that discusses specifically the incidence of appendiceal pathology among patients undergoing laparoscopic treatment of endometriosis.⁴ In this study of 65 women with symptomatic endometriosis and preoperative RLQ pain, 52 underwent appendectomy as part of the endoscopic surgery when Gastrografin enema screening or the visual appearance of appendix was abnormal.⁴ Thirty-nine (75%) had histologically confirmed pathology. In our study, 115 (49.8%) of 231 removed appendices had abnormal histology. This rate is somewhat lower than that reported in the other study. However, that study included only patients with RLQ pain, and the incidence of appendiceal pathology in this patient population is expected to be higher.

The current approach for surgical treatment of endometriosis is to excise or fulgurate all suspected areas. The appendix also should be carefully evaluated among all patients undergoing laparoscopy for the evaluation and treatment of endometriosis. Today, endoscopic surgery has proved successful in removing the appendix with few

and/or minimal complications.^{6,11-15} However, although the vermiform appendix may be an extragenital site for endometriosis, guidelines for appendectomy in patients undergoing surgery for pelvic endometriosis have not been defined since a study in 1983.¹⁶ Currently, there is still no preoperative symptom or examination finding that is sensitive or specific for predicting appendiceal involvement.¹⁷ In our study, 51 out of 115 (44.3%) appendiceal specimens revealed endometriosis. Supporting our findings, in the other study described above, 12 (31%) of 39 abnormal appendices had histologically confirmed endometriosis.⁴ Although the natural history of appendiceal endometriosis is not well known, we know that endometriosis of pelvic tissues can lead to adhesions that can result in pelvic pain and decreased fertility due to tubal dysfunction.¹⁸ In the case of the appendix, it could be proposed that the resultant adhesions and mass effect of the endometriosis could cause obstruction and lead to acute or intermittent appendicitis. Therefore, endometriosis of the appendix could complicate the already existent pelvic pain originating from the endometriosis not involving the appendix. Many gynecologic surgeons do not routinely evaluate the appendix during endometriosis-related operations. In such cases, the appendix may harbor in situ disease, with a theoretic risk of progression to clinical disease.¹⁷

The second most common appendiceal pathology found in this study was fibrous obliteration, present in 23.5% of patients. In a recent study of 317 patients who underwent appendectomy, 78 (24.6%) of them had obliteration of the appendiceal lumen.¹⁹ Fibrous obliteration of the appendix has dubious clinical implications. It has been theorized that the appendix may undergo bouts of acute inflammation followed by self-limited resolution.^{20,21} It is believed that the most likely cause of fibrotic changes is the result of a continuous inflammatory process, which may represent chronic appendicitis. Its endpoint can lead to the continuation of fibrosis throughout the inflammatory process or it can result in fulminant acute appendicitis.

To eliminate appendiceal pathologies from the differential diagnosis of lower quadrant pain is an important consideration in women, chiefly those who suffer from endometriosis. It is well known that appendiceal pathology is prevalent in women with chronic lower quadrant pain and may be responsible for the pain. In one study, it was reported that in patients who underwent operative laparoscopy for CPP, 30 (48%) of 62 removed appendices had abnormal histology.²² Likewise, in our study, approximately 50% of patients had various types of appendiceal pathologies as shown in Table 2. Additionally, in the last decade, several large series of laparoscopic appendectomy were reported in the literature, including nonrandomized^{6,23-26} and randomized controlled trials,¹³⁻¹⁵ and it has been demonstrated that the procedure is both feasible and safe. Thus, data support

the value of appendectomy in patients with endometriosis who undergo laparoscopic surgery for CPP.

Conclusion

During laparoscopic surgery of patients with CPP and endometriosis, we inspected the appendix and discovered multiple pathologic conditions. Thus, surgeons should be alert to the possible contribution of appendiceal pathology to the pelvic discomfort of patients with endometriosis. However, more prospective, randomized studies may be required before "routine" appendectomy can be recommended in women with CPP and endometriosis.

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