Laparoscopic Colorectal Resection for Bowel Endometriosis

Feasibility, Complications, and Clinical Outcome

Luca Minelli, MD; Francesco Fanfani, MD; Anna Fagotti, MD; Giacomo Ruffo, MD; Marcello Ceccaroni, MD; Liliana Mereu, MD; Stefano Landi, MD; Paola Pomini, MD; Giovanni Scambia, MD

Objective: To evaluate the short- and long-term outcomes of laparoscopic colorectal resection for endometriosis.

Design and Patients: This study included 357 consecutive patients who underwent colorectal resection. We evaluated intraoperative and postoperative complications, symptom outcomes, and long-term follow-up.

Main Outcome Measure: Three hundred forty-three patients (96.1%) underwent laparoscopic colorectal resection, and radical endometriosis ablation was achieved in 334 patients (93.6%).

Results: Fourteen (3.9%) required laparoconversion. Median operating time was 300 (range, 85–720) minutes, with a median estimated blood loss of 250 (range, 50–550) mL. Radical endometriosis ablation was achieved in 334 patients (93.6%). Median ileus was 4 (range, 1–8) days, with a median postoperative hospitalization of 8 (range, 3–36) days. Early and late complications were observed in 44 patients (12.3%) and, in 35 of these (79.5%), surgical management was necessary. Median follow-up after colorectal resection was 19.6 (range, 6–48) months. The median preoperative and postoperative dyspareunia scores were 8 (range, 4–10) and 3 (range, 0–10), respectively (P < .04), and the median preoperative and postoperative gastrointestinal tract symptom scores were 7 (range, 2–10) and 2 (range, 0–10), respectively (P < .05). During follow-up, 24 of 286 recurrences (8.4%) were registered. Patients who previously underwent surgery for endometriosis showed a higher risk of recurrence compared with patients undergoing primary surgery (13.2% vs 3.4%; P < .048).

Conclusions: Laparoscopic colorectal resection for severe endometriosis is feasible and markedly improved endometriosis-related symptoms. Despite the risk of major postoperative complications, the procedure shows good results in terms of recurrence rate and could be adopted as the primary approach for patients with symptomatic colorectal infiltrating endometriosis.

Arch Surg. 2009;144(3):234-239

The incidence of bowel endometriosis is estimated to range from 5.3% to 12%. The common amount of rectal and rectosigmoid junction involvement accounts for 70% to 93% of all intestinal endometriotic lesions.1

See Invited Critique at end of article

Rectovaginal and sigmoid endometriosis is generally associated with severe progressively debilitating abdominal and pelvic pain, which markedly affects the common quality of life of the patient. For these reasons, surgery needs to be considered the first treatment of choice.

In fact, medical therapy has been found to be ineffective2 or temporary, with a rate of recurrence as high as 76%,1 whereas surgical excision is effective in relieving pain.3 However, to ensure complete removal of the disease and the best results in terms of symptoms relief, intestinal surgery with or without segmental resection may be required.4,5 and the complexity and morbidity associated with these procedures should be considered.7-10

Several types of surgery have been described for severe bowel endometriosis. Debulking, which leaves some endometriosis on the bowel to avoid opening it, seems to have lost popularity, but it remains unclear whether and when discoid or segmental bowel resection should be performed.3,6 The argument in favor of segmental bowel resection is the completeness of endometriosis removal, especially if the area affected is larger than 2 cm.7,11,12

Laparoscopy has been demonstrated to be a safe and effective approach for the surgical treatment of bowel endometriosis, with a significant improvement in the quality of life of the patients.13,14 In a recent study,6 we
showed that the laparoscopic approach to severe pelvic endometriosis with segmental colorectal resection is feasible, with perioperative and short-term morbidity rates similar to those achieved by laparotomy.

Therefore, the aim of this study was to evaluate the feasibility of laparoscopic colorectal resection for severe endometriosis in a larger series of consecutive patients, the short-term complications, and the clinical outcomes in terms of long-term complications, pain relief, and recurrence rate.

**METHODS**

From January 7, 2002, through December 20, 2006, we enrolled 357 consecutive women who had severe endometriosis and colorectal involvement who were referred to the departments of obstetrics and gynecology of the Ospedale Sacro Cuore (306 cases) and the Catholic University of the Sacred Heart in Rome and Campobasso (51 cases) in this prospective study. All patients underwent operation by the same surgical team. The clinical medical records were available for all patients who provided informed consent for the use of their data for scientific purposes.

**Table 1** lists patient characteristics and their relevant surgical and medical histories. The median age of the patients was 32 (range, 22-47) years, and the median body mass index (calculated as weight in kilograms divided by height in meters squared) was 23.8. Infertility was noted in 129 patients (36.1%). Preoperative laparoscopy and/or laparotomy for endometriosis was recorded in 131 patients (36.7%), and 87 of these (66.4%) reported postoperative use of a gonadorelin acetate analogue. All patients completed an endometriosis-related symptom analog scale questionnaire (1 indicates an absence of symptom; 10, highest score) regarding dysmenorrhea, chronic pelvic pain, dyspareunia, and specific gastrointestinal tract disorders (ie, diarrhea and/or constipation, pain on bowel movement, intestinal cramping, pain on defecation, or cyclic rectal bleeding). Dysmenorrhea and chronic pelvic pain scores were reported with a median of 9 and 6, respectively. The median preoperative dyspareunia and gastrointestinal tract symptom scores were 8 and 7, respectively.

Preoperative workup included bimanual palpation, assessment of cancer antigen 125 levels, vaginal and abdominal ultrasonography, abdominal magnetic resonance imaging, and double-contrast barium enema. The median cancer antigen 125 level was 75.7 (range, 4-783) U/dL (to convert to kiloliters per liter, multiply by 1). Results of the double-contrast barium enema documented bowel stenosis of 50% or more in 219 patients (61.3%) with a median stenotic intestinal tract length of 1.8 cm.

Before surgery, all patients were counseled regarding the potential risks and benefits of this intervention. To assess the complete removal of pelvic deep endometriotic lesions, all patients underwent 2 pelvic examinations while under general anesthesia, one before surgery and the other at completion of surgery. Surgical procedures and perioperative management were performed as previously described. In April 2004, we initiated use of the nerve-sparing technique already described by Landi et al in an attempt to preserve the rectal sympathetic nerve fibers of the upper mesorectum, the sympathetic nerve fibers of the lower mesorectum, and the pelvic splanchnic nerves.

The level of the end-to-end anastomosis was defined according to distance from the anus as high/medium (≥8 cm), low (>5 and <8 cm), and ultralow (≤5 cm). The surgeon decided whether the patients would have temporary bowel diversion based on the outcome of the insufflation of air into the rectum in a water-filled pelvis.

Major complications were considered reintervention and bowel and/or urinary nerve dysfunction lasting longer than 30 days. Fever was defined as a body temperature of at least 38°C in 2 consecutive measurements at least 6 hours apart, excluding the first day after surgery. Patients were allowed to go home when they were fully mobile and appyrexial and passed urine satisfactorily and did not require narcotic analgesia.

All patients underwent clinical evaluation 1 month after surgery. Postoperative adjuvant therapy with gonadorelin analogue for 3 to 6 months was given only in patients undergoing assisted reproductive techniques.

Patients completed the same symptom questionnaire by telephone every 3 months in the first year after surgery, every 6 months in the second year, and yearly successively. Patient satisfaction with the outcome of surgery was scored from 1 to 5 (1 indicates total satisfaction; 2, satisfaction with mild symptoms; 3, satisfaction with moderate symptoms; 4, no change; and 5, worsening) at every follow-up visit. Relapse was defined as the presence of de novo symptomatic or asymptomatic endometrioma and/or a rectovaginal septum or bowel nodule during clinical follow-up visits.

Data are presented as medians and ranges. Categorical variables are reported as absolute values and percentages. We used the Fisher exact test or the χ2 test to analyze the distribution of complications and recurrence rates according to several clinicopathological features. P < .05 was considered statistically significant.

**RESULTS**

Three hundred fifty-seven consecutive patients underwent laparoscopic colorectal resection for deep endometriosis during the study period, and a fertility-sparing surgery was performed in all but 21 cases (5.9%).

In all cases, bowel infiltration of at least the external muscular layer was confirmed by definitive pathological findings.

Two hundred fifty-one patients (70.3%) had stage IV endometriosis; 62 (17.4%), stage III endometriosis; and 44 (12.3%), stage II endometriosis according to the revised American Fertility Society classification score. 
The median operating time was 300 minutes, with a median estimated blood loss of 250 mL (Table 2). Radical endometriosis ablation was achieved in 334 patients (93.6%). In the remaining cases, radical ablation was not achievable, especially for deep lateral and dorsal parametrial involvement with a high risk of nerve and vascular injuries. During endometriosis ablation, single or multiple bowel resection was performed in 335 (93.8%) and 22 (6.2%) patients, respectively. In particular, 227 patients (63.6%) underwent rectosigmoid resection; 57 (16.0%), rectum resection; 35 (9.8%), sigmoid resection; 22 (6.2%), sigmoid and ileum resections; 9 (2.5%), ileum; and 7 (2.0%), temporary ileostomy. Intraoperative nodules in the rectovaginal septum in 104 cases (29.1%) were removed laparoscopically, and 22 (6.2%) patients had body temperatures higher than 38°C for more than 2 days.

In the early postoperative period, complications were observed in 44 patients (12.3%), and surgical management was necessary in 35 of these (80%) (Table 3). The median time to the onset of complications was 9 (range, 2-24) days. There were 4 cases (1.1%) of anastomotic postoperative leakage (in 1 case, a positive pneumatic test resulted in performance of manual resuture on the mechanical anastomosis and defunctioning ileostomy at the initial surgery). Anastomotic leakage required the following procedures: laparotomic manual resuture of the bowel anastomosis in 14 cases (3.9%); the indication was massive hemorrhage in 4, several adhesions in 4, difficulty in endometriosis resection at the level of the coccygeal bone and the perirectal muscle in 3, and a decision by the colorectal surgeon in the remaining 3.

The median duration of ileus was 4 (range, 1-8) days, with a median postoperative hospitalization of 8 (range, 3-36) days. The median decrease in hemoglobin levels was 0.8 (range, 0.5-4.8) g/dL (to convert to grams per liter, multiply by 10), and heterologous blood cell transfusion was required in 39 patients (10.9%). Ninety-eight patients (27.5%) had body temperatures higher than 38°C for more than 2 days.
rogenic injury; treatment included laparoscopic suture and protective colostomy. Two cases of bowel obstruction (0.6%) resolved spontaneously after a diagnostic laparoscopy to exclude abscess and mechanical ileus (Table 3).

Urinary complications consisted of vesicovaginal fistula in 3 cases (0.8%) that required transurethral catheter for 30 days: laparoscopic cystorrhaphy in 1 patient and ureteral fistula managed with cystoscopic ureteral stent positioning followed by laparoscopic ureteral anastomosis in 2 patients. In 7 patients (2.0%), a severe hemoperitoneum occurred, and all of these cases were successfully managed by laparoscopy. Three episodes of pelvic abscesses (0.8%) were treated by successful laparoscopic drainage in patients undergoing vaginal resection. At the 1-month follow-up visit, 7 patients (2.0%) presented with anastomotic stenosis managed by progressive dilation in the office; in all of these patients, a 29-mm circular stapler was used. One patient had transient rectal bleeding (Table 3).

Transient urinary retention requiring self-catheterization occurred in 71 patients (19.9%). After 30 days, 34 patients (9.5%) presented with persistent urinary retention and 15 (4.2%) with constipation (Table 3). In the group of patients treated with the nerve-sparing technique, 5.8% presented with persistent urinary retention and 3.8% had constipation after 30 days. However, in the total study population, urinary symptoms resolved in all but 3 patients (0.8%).

When we considered different operative variables, there were no statistically significant differences in terms of bowel complications (Table 4). In particular, there were no significant differences in reintervention due to bowel complications among the different types of anastomosis (route and technique), the site and level of resection, the opening of the vagina wall, and primary and secondary surgical procedures for endometriosis.

Follow-up data were available for 286 patients (80.1%). The median follow-up period was 19.6 (range, 6-48) months. During this period, 86 of the 286 patients (30.1%) underwent gonadorelin analogue treatment for at least 3 months (maximum, 6 months). The median preoperative and postoperative dyspareunia scores were 8 (range, 4-10) and 3 (range, 0-10), respectively (P < .04), and the median preoperative and postoperative gastrointestinal tract symptom scores were 7 (range, 2-10) and 2 (range, 0-10), respectively (P < .04).

During the follow-up period, 24 recurrences were registered in the 286 patients (8.4%). In particular, 14 patients (4.9%) had de novo dyspareunia and/or debilitating symptoms of the gastrointestinal tract; in 6 asymptomatic patients (2.1%), transvaginal ultrasonography identified presumed endometriosis recurrence; and, in the 4 remaining patients (1.4%), clinical and instrumental criteria of relapse were found. Surgery for recurrence was performed in 11 patients, and, in all of them, histological findings indicated a diagnosis of endometriosis.

In patients who had previously undergone surgery for endometriosis, there was a higher risk of recurrence with respect to patients undergoing primary surgery (13.2% vs 3.4%; P < .048), whereas there were no differences between patients undergoing postoperative therapy.

The patients’ subjective satisfaction was classified as total in 212 of 286 patients (74.1%), total with mild symptoms in 33 (11.5%), total with moderate symptoms in 23 (8.0%), no change in 13 (4.5%), and worst in 5 (1.7%). The overall improvement in terms of symptoms was 93.7% (total, total with mild symptoms, and total with moderate symptoms vs those with no change and worsening).

In the subgroup of 113 patients referred for preoperative infertility, we observed 47 pregnant patients (41.6%), and we registered 64 pregnancies (mean number of pregnancies per patient, 1.4) in those 47 patients. In this subgroup of 64 pregnancies, pregnancies were spontaneous in 13 (20%) and followed assisted reproductive techniques in 51 (80%).

**COMMENT**

Although some women with bowel endometriosis may remain asymptomatic, most of them develop a variety of endometriosis-related symptoms such as dyspareunia and specific gastrointestinal tract dysfunction. For these patients, several medical therapies have been proposed, but previous studies have shown that aggressive surgery for deep pelvic endometriosis offers good symptom relief, significant improvement in quality of life, and renewed fertility. Furthermore, it seems unlikely that patients with a lesion of the large bowel may benefit from medical therapy because endometriosis is associated with fibrosis and sclerosis in the bowel wall, and these are unresponsive to hormonal manipulation.

When we consider that this kind of surgery has a certain percentage of specific morbidity and that it is usually offered in young women, the adequate selection of the patients appears to be a crucial step in the correct management of the disease. Because bowel endometriosis can be difficult to diagnose by clinical examination alone, an accurate anamnesis and specific radiological examinations should be combined to preoperatively identify patients who are candidates for colorectal resection. Among different patients undergoing primary surgery (13.2%) and those undergoing postoperative therapy (3.4%), a higher risk of recurrence was noted.

<table>
<thead>
<tr>
<th>Clinicopathological Variable</th>
<th>Complication Rate, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of anastomosis</td>
<td></td>
</tr>
<tr>
<td>High/medium</td>
<td>3.7</td>
</tr>
<tr>
<td>Low</td>
<td>5.3</td>
</tr>
<tr>
<td>Ultralow</td>
<td>13.0</td>
</tr>
<tr>
<td>Anastomosis technique</td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td>3.4</td>
</tr>
<tr>
<td>Mechanical</td>
<td>6.0</td>
</tr>
<tr>
<td>Stapler insertion route</td>
<td></td>
</tr>
<tr>
<td>Vaginal</td>
<td>11.0</td>
</tr>
<tr>
<td>Pfannenstiel incision</td>
<td>4.3</td>
</tr>
<tr>
<td>Type of bowel resection</td>
<td></td>
</tr>
<tr>
<td>Sigmoid</td>
<td>5.0</td>
</tr>
<tr>
<td>Rectosigmoid</td>
<td>5.1</td>
</tr>
<tr>
<td>Rectum</td>
<td>12.5</td>
</tr>
<tr>
<td>Sigmoid and ileum</td>
<td>5.3</td>
</tr>
<tr>
<td>Sigmoid and appendix</td>
<td>0</td>
</tr>
<tr>
<td>Ileum</td>
<td>0</td>
</tr>
<tr>
<td>Previous surgery for endometriosis</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>5.0</td>
</tr>
<tr>
<td>Yes</td>
<td>6.5</td>
</tr>
</tbody>
</table>

a Differences among clinicopathological variables were not significant.
radiological approaches for detection of bowel endometriosis, excellent results have been reported in the use of barium enema and rectal endoscopic ultrasonography.

We recently demonstrated that laparoscopic colorectal resection is feasible, with intraoperative and early postoperative morbidity rates similar to those achieved by laparotomy for patients with deep endometriosis. In this enlarged series, we confirmed those data and analyzed the long-term results in terms of pain relief, recurrence rate, and overall patient satisfaction.

In the study population, the complete excision of deep endometriosis was achieved in 93.6% of patients, confirming that laparoscopy could represent the criterion standard in the management not only of mild and moderate but also of severe endometriosis with bowel involvement. In addition, the operating time and estimated blood loss were similar to those in most studies on laparoscopic technique. In particular, the exclusion of complete endometriosis excision and those who had major complications. Conversely, there were no differences in the rate of postoperative recurrence between patients taking or not taking postoperative hormonal therapy. These results would suggest that the use of adjuvant hormonal therapy does not reduce the risk of recurrence in the presence of complete endometriosis excision and that ovarian surgery only. To define the treatment guidelines of severe endometriosis, these hypotheses should be investigated in a prospective randomized trial. Finally, although it was not a primary end point of this study, the reported successful pregnancy rate of 41.6% is noteworthy, suggesting a positive role of complete endometriosis excision in the fertility outcome of these patients, as reported by other authors.

In conclusion, laparoscopic colorectal resection for severe endometriosis appears feasible and markedly improves endometriosis-related symptoms. Despite the risk of major postoperative complications, this surgical approach shows good results in terms of the recurrence rate and could be adopted as primary treatment of patients with colorectal infiltrating endometriosis and debilitating related symptoms.

Accepted for Publication: February 5, 2008.
Correspondence: Francesco Fanfani, MD, Division of Gynecologic Oncology, Catholic University of the Sacred Heart, L.go A.Gemelli, 1, 86100 Campobasso, Italy (francesco.fanfani@rm.unicatt.it).

Author Contributions: Study concept and design: Fanfani, Fagotti, Ruffo, Ceccaroni, Mereu, and Scambia. Acquisition of data: Minelli, Fanfani, Landi, and Pomini. Analysis and interpretation of data: Fanfani. Drafting of the manuscript: Minelli, Fanfani, Fagotti, Ruffo, Ceccaroni, and Mereu. Critical revision of the manuscript for important intellectual content: Minelli, Fanfani, Landi, Pomini, and Scambia. Statistical analysis: Fagotti, Ceccaroni, Mereu, and Pomini. Administrative, technical, and material support: Landi.

Study supervision: Minelli, Fanfani, and Scambia.

Financial Disclosure: None reported.
inelli et al report a large series of 357 patients undergoing laparoscopic colorectal resection for endometriosis during a 5-year period with a median follow-up of 19.6 months. One should consider that colonic involvement of endometriosis occurs in roughly 10% of patients and does not require surgery in all of these patients.

There are several additional points to be made:

1. Notwithstanding specialty turf and related issues, if one does a lot of something and does it well, one gets very good results and helps patients, no matter what the field or area of interest. This applies to turf issues between and among all specialists.

2. Despite “salami slicing” and serial publication of slowly growing clinical series that add a few cases at a time to each serial publication, there is merit to publication of substantial increases in clinical cases, with longer-term follow-up and other valuable clinical data that give us information about the utility of different surgical techniques. In this example, changing to the nerve-sparing technique led to an improved clinical outcome.

3. Endometriosis in this report seems to behave like cancer, in the sense that, if one has a failed first operation, one is more likely to have a recurrence, in this case presumably owing to the difficulty of finding disease amid surgical adhesions. Surgeons with such patients should decide whether it might not be in their patients’ best interests to refer them for a proper operation as the first procedure.

4. Old-fashioned things are good! Although laparoscopy is newer, common sense and tried-and-true surgical workhorses, such as the omentum, continue to protect and help the patient and the surgeon, even if the method of access is different.

5. Symptoms due to endometriosis affecting the bowel are like long-standing Crohn disease intestinal strictures: they have a fibrotic component and are less likely to benefit from medical therapy and more likely to require and respond to surgical treatment.

6. Similar to several other disorders, only at operation can you get a true idea of the full extent of the endometriosis.

7. With the authors’ excellent clinical outcome, notably in terms of urinary incontinence, fertility, and surgical morbidity, one can only argue that patients with endometriosis who do not respond to medical therapy be sent to surgeons with such expertise as these authors. I applaud the authors for their attention to detail, careful patient selection, and continuing follow-up of their patients in an effort to improve clinical outcomes.

Susan Galandiuk, MD

Correspondence: Dr Galandiuk, Department of Surgery, University of Louisville School of Medicine, 550 S Jackson St, Louisville, KY 40202.

Financial Disclosure: None reported.