

# Laparoscopic Colorectal Resection for Bowel Endometriosis

## Feasibility, Complications, and Clinical Outcome

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**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 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 man-

agement 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.

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**T**HE INCIDENCE OF BOWEL ENDO-  
METRIOSIS 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.<sup>1</sup>

### 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 ineffective<sup>2</sup> or temporary, with a rate of recurrence as high as 76%,<sup>3</sup> whereas surgical excision is effective in relieving pain.<sup>4</sup>

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,<sup>5,6</sup> and the complexity and morbidity associated with these procedures should be considered.<sup>7-10</sup>

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.<sup>5,6</sup> The argument in favor of segmental bowel resection is the completeness of endometriosis removal, especially if the area affected is larger than 2 cm.<sup>7,11,12</sup>

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.<sup>13,14</sup> In a recent study,<sup>8</sup> we

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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 kilounits 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 after completion of surgery. Surgical procedures and perioperative management were performed as previously described.<sup>8</sup> In April 2004, we initiated use of the nerve-sparing technique already described by Landi et al<sup>15</sup> 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 ( $\geq 8$  cm), low ( $>5$  and  $<8$  cm), and ultralow ( $\leq 5$  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

**Table 1. Preoperative Characteristics in 357 Women With Severe Endometriosis and Colorectal Involvement<sup>a</sup>**

Characteristic	Data
Age, y	32 (22-47)
BMI	23.8 (18.6-31.2)
Infertility, No. (%)	129 (36.1)
Previous surgery for endometriosis, No. (%)	131 (36.7)
Previous gonadorelin acetate analogue therapy, No. (%) <sup>b</sup>	87 (66.4)
Preoperative cancer antigen 125 level, U/mL	75.7 (4-783)
Dyspareunia score	8 (4-10)
Gastrointestinal tract symptom score	7 (2-10)
Dysmenorrhea score	9 (5-10)
Chronic pelvic pain score	6 (2-8)
Bowel stenosis $\geq 50\%$ at DCBE, No. (%)	219 (61.3)
Stenotic intestinal tract length at DCBE, cm	1.8 (1.1-7.8)

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); DCBE, double-contrast barium enema. SI conversion factor: To convert cancer antigen 125 to kilounits per liter, multiply by 1.

<sup>a</sup>Unless otherwise indicated, data are expressed as median value (range).

<sup>b</sup>Based on 131 patients who underwent preoperative laparoscopic and/or laparotomic surgery for endometriosis.

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 afebrile 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  $\chi^2$  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.<sup>16</sup>

**Table 2. Operative Data<sup>a</sup>**

Operative Variable	Data
Operating time, median (range), min	300 (85-720)
Estimated blood loss, median (range), mL	250 (50-550)
Type of bowel resection	
Sigmoid	35 (9.8)
Rectosigmoid	227 (63.6)
Rectum	57 (16.0)
Sigmoid and ileum	22 (6.2)
Sigmoid and appendix	9 (2.5)
Ileum	7 (2.0)
Temporary ileostomy	41 (11.5)
Vaginal resection	113 (31.7)
Laparotomic conversion	14 (3.9)
Length of bowel resection, median (range), cm	10.2 (6-15)
Route of cranial part of circular stapler insertion	
Vaginal	88 (27.5)
Pfannenstiel incision	232 (72.5)
Anastomosis technique	
Manual	37 (10.4)
Mechanical	320 (89.6)
29 mm	289 (90.3)
31 mm	21 (6.6)
33 mm	10 (3.1)
Type of anastomosis	
High/medium	32 (9.0)
Low	298 (83.5)
Ultralow	27 (7.6)

<sup>a</sup>Unless otherwise indicated, data are expressed as number (percentage) of 357 or 320 patients.

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%), sigmoid resection and appendectomy; and 7 (2.0%), ileum resection (Table 2). In 244 patients (68.3%), there was no opening of the vaginal wall during the surgery, whereas, in the remaining 113 cases (31.7%), opening of the vaginal wall was required to remove endometriotic nodules in the rectovaginal septum in 104 cases (29.1%) and to perform hysterectomy in 9 (2.5%). In 41 patients (11.5%), temporary ileostomy was performed (Table 2). The median length of the bowel tract removed was 10.2 (range, 6-15) cm. An end-to-end anastomosis was performed with a circular stapler in 320 cases (89.6%), whereas, in the remaining 37 cases (10.4%), it was performed manually via minilaparotomy. The cranial parts of the circular stapler were inserted during minilaparotomy in 232 of the 320 cases (72.5%) and through the vagina in the remaining 88 cases (27.5%). In the 88 cases, after adequate left colon mobilization, the cranial stump of the colon was pulled out through the vaginal opening and the cranial part of the circular stapler was positioned; the bowel was repositioned in-

**Table 3. Early and Late Complications of Laparoscopic Colorectal Resection for Endometriosis in 357 Women**

Type of Complication	No. (%) of Patients	No. (%) Undergoing Reintervention
Early gastrointestinal tract		
Rectovaginal fistula	14 (3.9)	14 (3.9)
Anastomotic leakage	4 (1.1)	4 (1.1)
Bowel perforation	2 (0.6)	2 (0.6)
Bowel obstruction	2 (0.6)	2 (0.6)
Late gastrointestinal tract		
Anastomotic stenosis	7 (2.0)	0
Genitourinary		
Vesicovaginal fistula	3 (0.8)	1 (0.3)
Ureteral fistula	2 (0.6)	2 (0.6)
Other		
Hemoperitoneum	7 (2.0)	7 (2.0)
Pelvic abscess	3 (0.8)	3 (0.8)
Heterologous blood transfusion	36 (10.0)	0
Late vesical and rectal nerve dysfunction		
Urinary retention after 30 d	34 (9.5)	0
Constipation after 30 d	15 (4.2)	0

traperitoneally before vaginal laparoscopic suture, avoiding minilaparotomy. Anastomosis was classified as high/medium in 32 patients (9.0%), low in 298 patients (83.5%), and ultralow in 27 patients (7.6%) (Table 2). Laparoconversion occurred 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 piriform 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.

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**). 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 result led to 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 anastomosis and protective colostomy in 1 patient, low rectal resection with coloanal anastomosis and temporary ileostomy in 1, and laparoscopic sutures in 2 (1 of whom required further rectal resection). Fourteen rectovaginal fistulas occurred (3.9%) and were managed with the following procedures: loop ileostomies in 10 patients (including laparotomic loop ileostomies in 8 patients and laparoscopic loop ileostomies in 2 patients) and laparotomic resutures of the bowel anastomosis in 4. No permanent colostomies were necessary. Two cases of bowel perforation (0.6%) occurred at days 2 and 4, in sites far from the anastomosis and probably due to iat-

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

**Table 4. Early Gastrointestinal Tract Complication According to Clinicopathological Variables<sup>a</sup>**

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

<sup>a</sup>Differences among clinicopathological variables were not significant.

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.<sup>9</sup> 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,<sup>4,16</sup> and renewed fertility.<sup>17,18</sup> 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.<sup>2,9</sup>

When we consider that this kind of surgery has a certain percentage of specific morbidity<sup>7-10</sup> 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

radiological approaches for detection of bowel endometriosis, excellent results have been reported in the use of barium enema<sup>19</sup> and rectal endoscopic ultrasonography.<sup>20-22</sup>

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.<sup>8</sup> 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 colorectal resection,<sup>5,12,23</sup> reflecting the complexity of this kind of surgery. In the early postoperative period, 44 of 357 patients (12.3%) experienced complications, and 35 (9.8%) required additional surgery. These results are in agreement with the data reported in the literature for laparoscopic<sup>5,8,12,14,23</sup> and laparotomic<sup>24,25</sup> colorectal resection for deep endometriosis. The most frequent early complication was bowel fistula (ie, anastomotic leakage, bowel perforation, and rectovaginal fistulas), but no correlation was found with surgical techniques. In particular, the expected complication risk factor of the vaginal wall opening could be controlled by placing an omental flap between the vaginal suture and the bowel anastomosis if both were performed at the same level.<sup>8</sup> Moreover, the closure of the vagina before bowel resection could reduce the risk of anastomotic infection and failure. Finally, as previously reported,<sup>8</sup> the comparison of bowel fistulas between the different levels of anastomosis did not reach statistical significance, probably because of the potential bias of the protective temporary ileostomy that was usually adopted in patients with a very low rectal anastomosis. On the other hand, the few cases of anastomotic and rectovaginal fistulas in patients who underwent low and ultra-low anastomosis confirmed that the risk of anastomotic leakage is not totally preventable.

Although long-term urinary tract and rectal dysfunction could be considered a surgery-related morbidity that significantly affects the quality of life of these patients, they are not mentioned in most published reports. In our present series, we reported persistent and significant urinary retention and constipation in 9.5% and 4.2% of the patients, respectively. These data are better than those reported in other studies<sup>22</sup> and probably result from the adoption of a nerve-sparing technique at our institutions beginning in April 2004.<sup>15</sup> In this study, we also confirm that the nerve-sparing approach could improve urinary and rectal postoperative functions, but this sparing technique can be invalidated by the presence of deep and dorsal diffuse parametrial endometriosis.

The overall morbidity for laparoscopic colorectal resection for severe endometriosis cannot be ignored. Therefore, this operation should be offered to women with severe symptoms who are unresponsive to medical therapy and in whom conservative radical surgery seems to be the only option. Furthermore, the analysis of the data year by

year has shown a reduction in the mean operating time and the rate of major complications,<sup>8</sup> even with an increase in the number of correlated surgical procedures.<sup>10</sup> These improvements may be the result of a long learning curve for this type of surgery, often characterized by severe anatomical subversion and the significant presence of adhesions.

As far as long-term outcome is concerned, a significant improvement in quality of life has been reported for this kind of surgery,<sup>13</sup> even in patients who required laparotomy and those who had major complications.<sup>14</sup> Similarly, in our study population, we registered a significant improvement in dyspareunia and gastrointestinal tract symptoms, with an overall subjective satisfaction with the procedure in most of the patients (93.7%).

In 286 patients with a median follow-up of 19.6 months, we identified 24 clinical and/or instrumental recurrences (8.4%). Among these patients, those who had undergone previous surgery for endometriosis showed a higher risk of relapse, suggesting that the presence of postoperative adhesions could hinder a radical endometriosis excision. 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 and extraovarian debulking can achieve better results in terms of endometriosis relapse compared with 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.<sup>17</sup>

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.

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## INVITED CRITIQUE

**M**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 series, 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.

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