

# Clinical and quality-of-life outcomes after fertility-sparing laparoscopic surgery with bowel resection for severe endometriosis

Stephen D. Lyons, PhD, MRANZCOG, Simon S.B. Chew, FRACS,  
Angus J.M. Thomson, MRCOG, Meegan Lenart, CNS, Catherine Camaris, FRCPA,  
Thierry G. Vancaillie, FRANZCOG, and Jason A. Abbott, FRANZCOG, PhD

*From the Department of Endo-Gynaecology, Royal Hospital for Women (Drs. Lyons, Thomson, Vancaillie, and Abbott, and Ms. Lenart); the Department of Anatomical Pathology, Prince of Wales Hospital (Dr. Camaris); and the Department of Colorectal Surgery, Nepean Hospital (Dr. Chew), Sydney, Australia.*

## KEYWORDS:

Laparoscopy;  
Endometriosis;  
Bowel resection;  
Quality of life;  
Pelvic pain;  
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## Abstract

**STUDY OBJECTIVE:** To describe the effect of fertility-sparing laparoscopic excision of endometriosis and bowel resection on clinical and quality-of-life outcomes.

**DESIGN:** Prospective observational cohort study (Canadian Task Force classification II-2).

**SETTING:** Australian tertiary referral center for the surgical treatment of endometriosis.

**PATIENTS:** Seven consecutive patients with known endometriosis involving the bowel.

**INTERVENTION:** Laparoscopic resection of all endometriosis, including laparoscopic bowel resection with end-to-end anastomosis with or without temporary ileostomy.

**MEASUREMENTS AND MAIN RESULTS:** Preoperative and 12-month postoperative data were collected by use of visual analogue scores for dysmenorrhea, nonmenstrual pelvic pain, dyspareunia, and dyschezia. Validated research tools (SF12, EuroQOL, and Sexual Activity Questionnaire) also assessed quality of life. Reduction in median pain scores at baseline was demonstrated and at 12 months after operation for dysmenorrhea 71 (interquartile range 43–85) versus 5 (0–10);  $p = .028$ , nonmenstrual pelvic pain 74 (48–85) versus 11 (0–18);  $p = .046$ , dyspareunia 66 (0–98) versus 5 (0–8);  $p = .080$ , and dyschezia 48 (20–64) versus 20 (0–40);  $p = .173$ . All measures of quality of life were improved at 12 months after surgery, although not reaching statistical significance because of the small sample size. All three women wishing to conceive after operation have been successful, resulting in three live births at term. There were few complications associated with this surgery.

**CONCLUSION:** Fertility-sparing laparoscopic excision of endometriosis with bowel resection results in improvements in all aspects of pain and quality of life. Results appear to parallel published data for conservative resection of endometriosis not involving bowel. For women with severe endometriosis involving bowel, this surgical treatment provides a viable alternative to pelvic clearance and successfully maintains fertility.

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Surgical treatment for severe endometriosis with bowel involvement has classically involved laparotomy, pelvic clearance with surgically-induced menopause, and bowel resection.<sup>1-3</sup> Many women do not wish to undergo such radical surgery and, if fertility is desired, this treatment is not a viable option. Despite the rapid evolution of fertility-sparing laparoscopic surgery, including bowel resection for endometriosis, it is not fully established what impact such complex surgery has on patient outcomes and quality of life.<sup>4-8</sup> Prospective studies on laparoscopic excision of endometriosis not requiring bowel resection have shown significant improvements in pain symptoms and quality of life, which persist at 2 to 5 years after surgery.<sup>9</sup> Recent prospective studies examining the role of laparoscopic bowel resection for severe endometriosis involving bowel report significant reductions in dysmenorrhea, nonmenstrual pelvic pain, dyspareunia, and dyschezia.<sup>10,11</sup> To date, there are no reports of prospective studies on the effects of this type of surgery on quality of life as assessed by validated research tools. This article describes the clinical and quality of life outcomes of a pilot study of laparoscopic bowel resection for severe endometriosis.

## Materials and methods

The institutional human ethics committee granted approval for this study. All patients signed an informed consent for participation in the study. Between March and November 2003, seven consecutive patients undergoing laparoscopic colorectal surgery for intestinal endometriosis were recruited to this pilot study. Demographic data were collected before operation for presenting symptoms, menstrual history, reproductive history, and previous medical and surgical treatment for endometriosis. A team consisting of a gynecologist and a colorectal surgeon performed all surgeries. Patients were selected for the index surgery on the basis of previous surgical findings, presenting symptoms, physical examination and colonoscopy. Before admission patients were commenced on a low-residue diet (full fluids 2 days before and clear fluids 1 day before surgery) with formal bowel preparation by use of a hyperosmolar solution (Picoprep; Pharmatel, Sydney, Australia) on the day before surgery.

Surgery included laparoscopic resection of all visible endometriosis, including resection of the affected bowel

with primary anastomosis. During bowel resection, the sigmoid and rectum were mobilized laparoscopically. The rectum was transected distal to the lesion with a transverse stapler via a 3- to 5-cm extension of the suprapubic port site. The proximal bowel was then exteriorized and the affected bowel resected. The anvil of a circular staple was secured to the proximal end of the rectum or sigmoid with a purse-string suture before being returned to the peritoneal cavity. The proximal and distal bowel ends were approximated and anastomosed with a circular stapler. In the case of lesions situated just above the pelvic floor, an ultra-low anterior resection is required with creation of a temporary diversion loop ileostomy. Ileostomy reversal was undertaken 3 months after the index surgery. Revised American Fertility Society (rAFS) endometriosis scores were assigned during surgery.<sup>12</sup> Duration of surgery, estimated blood loss, length of admission, surgical complications, and readmissions within 30 days of surgery were also recorded. Blood loss was estimated from suction canister aspirates.

Major postoperative complications were: death, unrecognized surgical complications of the intestinal tract, urinary tract or vascular system, bowel anastomosis leak or pelvic abscess, rectovaginal fistula, medical complication, pulmonary embolus, major deep vein thrombosis, pyrexia greater than 39°C requiring treatment with intravenous antibiotics, and hemorrhage requiring transfusion but without a return to the operating room. Minor postoperative complications were inclusive of pyrexia between 37.5° to 38.9°C on two consecutive occasions and requiring antibiotic therapy, transient urinary retention, below-knee deep vein thrombosis necessitating anticoagulation, respiratory infection requiring conservative management but not antibiotic therapy, ileus, and electrolyte disturbance or fluid overload.

Pain symptoms and quality-of-life scores were quantified before and at 1 year after surgery. Pain was assessed with a visual analog scale (VAS) for dysmenorrhea, nonmenstrual pelvic pain, dyspareunia, and dyschezia. A 101-point scale was used (0–100 mm), with zero representing “no pain” and 100 representing “the worst imaginable pain.” Quality-of-life data were collected by use of three validated instruments. The EQ-5D instrument has two components: the EQ-5D<sub>Index</sub> quantifies health state in terms of five dimensions (mobility, self-care, usual activity, pain or discomfort, and anxiety or depression), and the EQ-5D<sub>VAS</sub> generates a self-rating of current health-related quality of life.<sup>13</sup> The Short Form 12 Health Survey (SF-12) expresses general health status in terms of physical and mental functioning, with results expressed as the Physical Component Summary and the Mental Component Summary scores.<sup>14</sup> The Sexual Activity Questionnaire assesses sexual function in terms of pleasure, habit (frequency), and discomfort.<sup>15</sup>

Statistical analysis was performed with SPSS 13.0 (SPSS, Inc., Chicago, IL). Analysis of pain scores and quality of life data was undertaken with the Wilcoxon rank

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Corresponding author: Corresponding author: Stephen Lyons, PhD, MRANZCOG, Department of Endo-Gynaecology, Royal Hospital for Women, Barker Street, Randwick, Sydney, NSW 2031, Australia.

E-mail: stephen.lyons@sesiahs.health.nsw.gov.au.

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**Table 1** Patient demographics

Case	Age	Previous pregnancy/ History of infertility	rAFS score	Surgery	Pregnancy after surgery
1	23	No/Yes	154	Rectal resection	Yes*
2	25	No/No	158	Rectal resection	No
3	27	No/Yes	72	Rectal resection	Yes*
4	30	No/No	50	Rectosigmoid resection	No
5	30	No/Yes	50	Rectal resection + ileostomy	Yes*
6	30	No/No	58	Rectal resection + ileostomy	No
7	43	No/Yes	50	Rectal resection + ileostomy	No

rFAS = Revised American Fertility Society.

\*Pregnancy resulted in a live birth.

sum test for paired nonparametric data. Statistical significance was set at  $p < .05$ .

## Results

The study population consisted of seven patients with a median age of 30 years (range, 23–43 years) at the time of surgery (Table 1). All women were nulliparous, and four had primary infertility, defined as more than 12 months of regular, unprotected sexual intercourse without pregnancy. All patients had previously been diagnosed with histologically confirmed endometriosis requiring ablation or excision. Three patients had previously undergone laparoscopic surgery in this unit for primary excision of stage IV endometriosis, including full-thickness vaginal disease.

Preoperative symptoms of dysmenorrhea, nonmenstrual pelvic pain, and dyschezia were present in all patients. Cyclical rectal bleeding and dyspareunia were present in five patients. Flexible sigmoidoscopy was performed before operation in six patients, four of whom were reported as normal. Full-thickness disease was obvious in one case (Figure 1) and, in another, a large nodule was noted to compress but not invade the rectum.

Surgery included laparoscopic resection of all visible endometriosis including affected bowel. Temporary ileostomy was performed in three cases where ultra-low anterior resection was necessary. There were no conversions to an open procedure, no significant intraoperative complications were reported, and no patient required a return to the operating room. The median surgery time was 5.0 hours (range 3.7–7.0 hours), and the median estimated blood loss was 200 mL (range 20–400 mL). No cases required postoperative blood transfusion. The median duration of admission was 7.0 days (range 5.2–9.9 days). Postoperative complications were infrequent and were limited to a urinary tract infection in 1 patient and an ileus in another. There were no major postoperative complications in the immediate postoperative period. One patient was found to have urinary retention at routine follow-up 1 month after surgery. She performed clean intermittent self-catheterization until bladder function normalized (8 months after surgery). One pa-

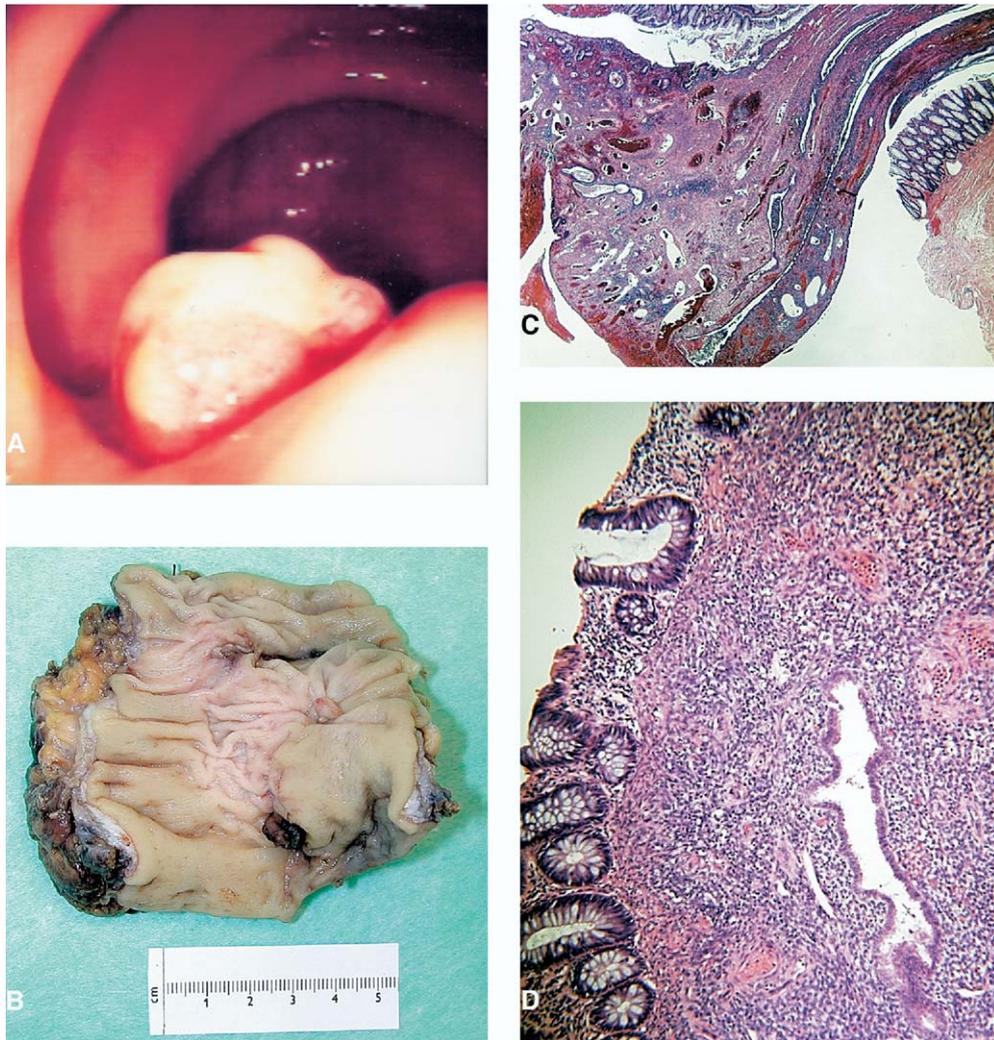
tient was readmitted within 30 days with a subacute small bowel obstruction that responded to conservative management. All ileostomies were reversed after 3 months without complication.

All patients had stage IV endometriosis, the median rAFS endometriosis score being 58 (range 50–158). Obliteration of the cul-de-sac was found in every case. The residual length of resected bowel was 92 mm (range 60–190 mm), and the surgical margins were clear of disease in six of seven patients (foci of disease confined to the muscularis propria in one patient). Depth of disease invasion was found to be to the level of the muscularis propria in two patients, the submucosa in 4 cases, and the mucosa in only one.

Pain score results are shown in Table 2. Reduction in all four pain symptoms was observed at 1-year follow-up, reaching statistical significance for dysmenorrhea and nonmenstrual pain.

Outcomes from the quality of life instruments showed that women generally reported better quality of life after surgery compared with baseline, although the results did not reach statistical significance. Median scores were increased at 12 months after surgery compared with before operation for EQ-5D<sub>VAS</sub> 60 (IQR 31–80) versus 80 (IQR 80–90);  $p = .24$ , and EQ-5D<sub>Index</sub> 0.62 (IQR 0.26–0.80) versus 0.80 (IQR 0.73–1.00);  $p = .25$ . The SF-12 quality of life results are similar, with increased median quality of life scores 12 months after surgery compared with baseline for the Physical Component Summary score 36 (IQR 28–53) versus 53 (49–54);  $p = .063$ , and Mental Component Summary score 47 (37–55) versus 57 (50–58);  $p = 0.63$ . The Sexual Activity Questionnaire median scores 12 months after surgery compared with baseline were increased for pleasure 13 (IQR 6–14) versus 15 (IQR 13–16);  $p = .21$ , unchanged for habit 1.00 (IQR 0.75–1.00) versus 1.00 (0.00–1.00);  $p = 1.00$  and decreased for discomfort 1.00 (IQR 0.00–2.00) versus 0.00 (IQR 0.00–0.50);  $p = .10$ . Failure to reach statistical significance for the quality of life data is not surprising given the small population size of this pilot study.

Fertility was maintained after the index surgery, with the three patients attempting to become pregnant being successful (Table 1). All were diagnosed with primary infertility, with one patient diagnosed with bilateral tubal occlusion at



**Figure 1** Images from patient (Case 7, Table 1) with full-thickness rectal endometriosis: (A) View at sigmoidoscopy shows endometrial polyp in rectal lumen. (B) Resected rectum contains endometrial polyp seen in A, as well as several other foci of disease. (C) Hemorrhagic ulcerated polyp composed of endometrial glands and stroma protruding through rectal mucosa. (D) Endometrial gland and stroma within mucosa with adjacent rectal epithelium.

intraoperative dye hydrotubation. All three patients gave birth to live infants by cesarean delivery at term.

## Discussion

The pain and quality of life outcomes of this study parallel the results of long-term studies of laparoscopic resection of endometriosis not involving bowel.<sup>9</sup> Statistically significant improvements in dysmenorrhea and non-menstrual pelvic pain, and reductions in dyspareunia and dyschezia, which were not statistically significant, confirm the effectiveness of laparoscopic resection of endometriosis involving bowel recently reported by others.<sup>10,11</sup> To date there has been no prospective study on the effects of this type of surgery on quality of life as assessed by validated research tools. This study demonstrates a general improvement, although not to statistical significance, for quality of

life outcomes derived from the EQ-5D, SF-12, and Sexual Activity Questionnaire.

The only major operative complication in our series was significant and prolonged urinary retention in 1 patient. This woman had a large endometriotic nodule that compressed the rectum and filled both pararectal spaces to the level of the pelvic floor. Its removal is likely to have damaged the parasympathetic plexus to the bladder, leading to the temporary reduction in bladder function. Such complications during radical excision should be expected, diagnosed, and appropriately treated to prevent long-term sequelae. Although few complications were noted in this study, there is potential for significant morbidity, and major complication rates of up to 10% are reported.<sup>10</sup> In particular, anastomotic leaks are reported to occur in 3% to 6% of cases and may have dire consequences for fertility.<sup>7,11</sup> Additionally, the development of rectovaginal fistulas necessitates further intervention and may significantly reduce quality of life.<sup>10</sup>

**Table 2** Preoperative and 1-year postoperative pain scores

Symptoms	Median score* (IQR)	p Value†
Dysmenorrhea		
Baseline	71 (43-85)	.028
1 Year	5 (0-10)	
Nonmenstrual pelvic pain		
Baseline	74 (48-85)	.046
1 Year	11 (0-18)	
Dyspareunia		
Baseline	66 (0-98)	.080
1 Year	5 (0-8)	
Dyschezia		
Baseline	48 (20-64)	.173
1 Year	20 (0-40)	

IQR = interquartile range.

\*Scores from visual analogue scale.

†Wilcoxon signed ranks test.

It has been noted previously that there is a poor correlation between the extent of endometriosis and pain symptoms.<sup>9</sup> A poor correlation between gastrointestinal symptoms and the extent and depth of endometriotic foci is similarly reported and may account for the varying presenting features of patients in this series.<sup>16,17</sup> All 7 patients in this series had dyschezia, with 5 women experiencing cyclical rectal bleeding. Histopathologic study confirms that endometriosis invaded the muscularis propria in every case, extending into the submucosa in 5 cases, but full-thickness disease was evident in only 1 patient (Figure 1). Such results are consistent with normal preoperative colonoscopy findings in most cases. The value of colonoscopy in the preoperative workup has been questioned, since a normal finding, as we report, does not exclude significant disease.<sup>18</sup> We suggest that colonoscopy may diagnose more sinister causes of rectal bleeding, which although rare in this population would be an important differential diagnosis and allow for early planning of elective ileostomy.

Despite a radical surgical approach with wide excision margins of affected bowel, histologic evidence of disease was found in the bowel resection “doughnut” in 1 case. This conforms to our knowledge of endometriosis being present in macroscopically unaffected peritoneum<sup>19,20</sup> and that intestinal endometriosis lesions are multifocal in 40% to 62% of cases, and multicentric in 38% of cases.<sup>16,17</sup> Such residual lesions may account for the recurrence of symptoms in patients after such surgery. Overall, recurrence of bowel endometriosis has been reported in 4% to 11% of patients after laparoscopic bowel resection.<sup>17,21</sup>

All 7 patients in this series were nulliparous, and 4 patients had a history of primary infertility. All 3 patients (100%) attempting to become pregnant since surgery have been successful. This is consistent with other studies, which report a pregnancy rate of 25% to 50% after laparoscopic bowel resection for severe endometriosis.<sup>6,7,10,11,17</sup>

During this initial experience the mean duration of patient admission was 7.5 days. This approximates to the period of the highest risk of anastomotic leak, usually between 5 to 7 days after operation, at the time of first bowel motion.<sup>22</sup> Since this study, a modified preoperative bowel preparation with only an enema has decreased the time to first bowel motion, with resultant decreased length of stay (usually 1 to 2 days) and comparable complication rates (unpublished data).

In summary, this pilot study shows that laparoscopic surgery with bowel resection for severe endometriosis results in reductions for all measured pain parameters, some of which are significant, and nonsignificant improvements in all quality of life and sexual function assessments for up to 1 year after surgery, and fertility is maintained. We estimate that to achieve statistical significance for all study outcomes, a sample size of approximately 30 patients would be required for pain parameters, and a sample size of up to 50 patients would be necessary for the quality of life assessments. Although technically complex, this treatment can maintain fertility even in the most severe cases of disease, while having a modest complication rate. The optimal surgical team will include both gynecologic and colorectal surgeons with experience in resection of extensive endometriosis and bowel resection, respectively. Under these circumstances, this surgical treatment provides a viable alternative to pelvic clearance for symptomatic control while successfully maintaining fertility in women with severe endometriosis involving bowel.

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