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Surgical treatment of symptomatic colorectal endometriosis

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The approach to the treatment of bowel endometriosis has varied greatly. In this paper we present 77 consecutive patients with deep colorectal endometriosis treated with a full-thickness resection. Gynecologic procedures included conservative laparotomies for preserving fertility (39 patients); hysterectomy with bilateral salpingo-oophorectomy (29 patients); bilateral salpingo-oophorectomy (2 patients); left salpingo-oophorectomy (1 patient) and resection of pelvic endometriosis in patients with previous ablative surgery (6 patients). A low anterior bowel resection was performed in 68 patients (88.3%); a disc excision of the anterior rectal wall in 5 (6.5%); sigmoid resection in 3 (3.9%), and partial cecal resection in 1 (1.3%). The postoperative febrile morbidity was 10.4%, with no apparent anastomotic leaks. Of 33 patients who attempted to conceive postoperatively, 13 achieved a term pregnancy (39.4%). Complete relief of pelvic symptoms was obtained in 38 patients (49.4%); improvement in 30 (39%); no improvement in 8 (10.4%); and worsening of symptoms in 1 (1.2%). There has been no recurrence of symptomatic bowel endometriosis during 1 to 9 years of follow-up. Full-thickness resection of the colon for the treatment of deep bowel endometriosis is a safe procedure with low morbidity, good postoperative relief of symptoms, and favorable pregnancy rates. Fertil Steril 53:411, 1990

Since Sampson's[1] original observation and report of intestinal endometriosis, there have been many articles published on this subject. The approach to the treatment of bowel endometriosis has varied greatly. There is a tendency to avoid resectional or excisional surgery in patients with deep colorectal endometriosis, for fear of increased postoperative complications when a major procedure on the colon is performed.[2] The majority of the resections involve removal of the cul-de-sac;[3] therefore, a very low anastomosis between the colon and midrectum usually results. The reported leak rates for this type of operation range from <1%,[4] to >50%,[5] indicating a significant degree of technical variability among surgeons. Bowel endometriosis is often unexpectedly found at the time of hysterectomy or conservative surgery for endometriosis. Bowel symptoms, which are often present, are missed because of oversight at the initial evaluation.[6] Pelvic endometriosis is usually managed by the gynecologist with no formal training in bowel surgery. The operative findings of bowel endometriosis may either be neglected or lead to consultation with a general surgeon who may have little experience with colorectal endometriosis.

The purpose of this report is to show that a full-thickness resection of the colon for the treatment of deep colorectal endometriosis is a safe procedure with low morbidity, good postoperative relief of symptoms, and favorable pregnancy rates.

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MATERIALS AND METHODS

Our patient group consisted of consecutive cases of deep colorectal endometriosis treated by the au-

thors from 1979 to 1987 with a full-thickness bowel resection. We obtained the information for this study by chart review and updated it by personal or telephone interviews. A total of 77 patients at The Woman's Hospital of Texas fit the criteria, which included laparotomy for severe endometriosis with the finding of deep bowel endometriosis requiring either full-thickness disc excision or segmental resection with primary end-to-end anastomosis. Patients with superficial colorectal endometriosis were treated by either excision or vaporization of the implants with carbon dioxide laser, and they are not included in this report.

The mean age of our patient group was 32 years (range 22 to 49). Of our study group, 41 patients (53.2%) had been trying to achieve a pregnancy without success. Data regarding duration of infertility preoperatively was available in 24 of these patients and revealed an average of 50 months (range 12 to 144) of infertility. Twenty-six patients had achieved pregnancy previously, 13 of them ending in spontaneous abortions (50%). Most of the patients had symptoms commonly related to endometriosis (pelvic pain, dysmenorrhea, dyspareunia), but in this study, a history of specific bowel complaints was solicited. Symptoms elicited preoperatively included rectal pain (74%), dyspareunia (46%), constipation (49%), diarrhea (36%), and rectal bleeding (31%). Forty (52%) of our patients had previous surgical treatment for endometriosis, either conservative or ablative as follows: conservative in 31, total abdominal hysterectomy and bilateral salpingo-oophorectomy (TAH/BSO) in 6, hysterectomy in 2, and hysterectomy with right salpingo-oophorectomy in 1. Thirty-two patients (42%) had only diagnostic procedures, i.e., diagnostic laparoscopy in 29, and diagnostic laparotomy in 3. Five patients (6%) had no previous surgery.

Preoperative physical examination findings included cul-de-sac nodularity in 65 (84%) and fixation of the rectum in 41 (53%). Seventy-four patients had a preoperative consultation and proctosigmoidoscopy by the colorectal surgeon. Three patients had an intraoperative consultation. Although at the time of proctosigmoidoscopy endometriosis had rarely invaded into the lumen of the bowel (2 cases proven by biopsy), 15 of the patients had mucosal distortion and/or flattening due to submucosal extension of the endometriosis. One patient had erythema, edema, and narrowing of the bowel lumen. Seventy-three patients had a preoperative barium enema and intravenous pyelogram. Abnormal barium enema studies in 18 patients revealed the following: extrinsic compression in 4, stricture in 2, a filling defect in 1, and unspecified abnormalities in 9. Abnormal intravenous pyelograms in 8 patients (11%) included the following: extrinsic bladder compression in 2, ureteral deviation in 1, ureteral compression in 3, left ureteral obstruction with hydronephrosis in 1, and a longstanding nonfunctional right kidney in 1.

Duration of postsurgery follow-up was 1 to 9 years. All follow-up pain data was obtained by interview at least 1 year postoperatively by asking the patient to determine if pain relief was complete, partial, unchanged, or if pain had grown worse.

The gynecologic procedures were performed by R.R.F. and E.C.L. using microsurgical techniques. The carbon dioxide laser was utilized as an adjuvant in dissection and excision or vaporization of endometriosis. Uterine suspension was performed when needed. The colon procedures were performed by H.R.B.

Preoperative bowel preparation consisted of the following: On day 1, clear liquids, saline enemas, oral phosphosoda and bisacodyl tablets; on day 2, clear liquids, saline enemas, neomycin 1 gm postoperatively three times daily, and erythromycin 1 gm postoperatively three times daily. Prophylactic antibiotic therapy with cefoxitin was administered perioperatively. The patients desiring pregnancy underwent preoperative therapy with danazol, 800 mg per day for 3 months prior to surgery. Preoperative danazol was not given to the patients who were to have a TAH/BSO, or to those who had already had a hysterectomy. A full-thickness resection was performed in all cases of deep colorectal endometriosis by either a disc or segmental resection with end-to-end anastomosis. The segmental resection was carried out beginning above the area of grossly visible or palpable disease by mobilizing the lateral aspect of the sigmoid colon on the left, identifying the left ureter, then entering the presacral space, and elevating the rectum from the hollow of the sacrum. The uterosacral ligaments were resected en bloc attached to the rectosigmoid colon whenever they were significantly involved with endometriosis. After the rectum had been mobilized posteriorly and laterally, a plane was developed in the rectovaginal septum below the area of involvement with endometriosis. It was often necessary to remove a portion of the vaginal muscularis with the bowel specimen, to completely excise the endometriosis. Once normal rectal tissue below the area of involvement was encountered as assessed by gross

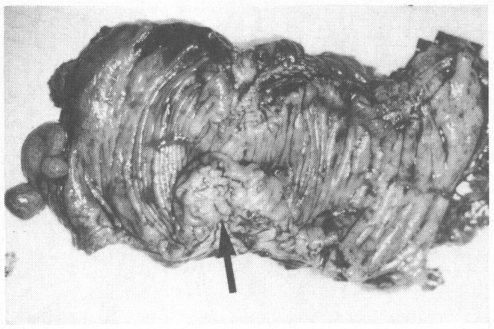

Figure 1 Surgical specimen obtained at segmental resection of rectosigmoid colon. Note nodular mass of endometriosis (*arrow*). This lesion was almost totally obstructive as evidenced by dilated proximal segment (*left*) with flattened mucosal folds.

examination and palpation, an end-to-end anastomosis was performed using a continuous polypropylene suture in a single layer. Since the length of bowel involved with endometriosis was relatively short in all cases, a tension-free anastomosis could be readily constructed with the colon and rectum that remained. A Jackson-Pratt drain was placed in the presacral space. Thirty-two percent dextran 70 was not used in this patient group. Nasogastric suction was not utilized. Resumption of oral feeding was initiated after spontaneous release of flatus (usually about the 3rd or 4th postoperative day). A Foley catheter was left in place for 4 or 5 days to prevent bladder distention pressure on the anastomosis.

RESULTS

In 77 patients, the anatomic distribution of the bowel lesions was as follows: rectosigmoid colon in 72, rectosigmoid and ileum in 1, upper sigmoid colon in 3, and cecum in 1. The most common location was in the rectosigmoid (Figs. 1 and 2); 1 of these patients also had an implant located in the terminal ileum. The bowel procedures performed in these 77 patients are described in Table 1. For comparison to the surgical population at our hospital, a review of the 1,616 surgical procedures performed for endometriosis in 1983 at The Woman's Hospital of Texas revealed that a colorectal resection was carried out in only 16 (1%) of them. Pathologic confirmation of endometriosis involving the bowel was obtained in all 77 cases; however, comments regarding depth of invasion and involvement of the surgical margins were not made. Four patients had to have extensive ureterolysis. No colostomies were necessary. Appendectomy was carried out in 8 patients (10.4%) with appendiceal endometriosis; otherwise, this procedure was not performed routinely. After 1 to 9 years of follow-up, 38 patients (49%) had complete relief of symptoms, 30 (39%) had satisfactory improvement, 8 (11%) reported the severity of their symptoms as being the same as before surgery, and 1 (1%) patient had worsening of her symptoms. Relief of symptoms in the 38 patients having removal of all ovarian tissue revealed complete relief in 21 and satisfactory improvement in 17. The gynecologic procedures performed are described in Table 1. Among the patients having conservative surgery, left salpingo-oophorectomy was performed in 7. Of the 6 patients who had a TAH/BSO previously done, residual ovarian tissue was found in 3, and there was no

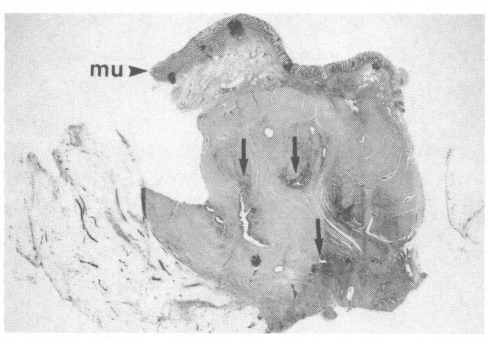

Figure 2 Photomicrograph of rectosigmoid wall showing endometrial glands and stroma (*arrows*) surrounded by markedly hyperplastic colonic muscularis. The intestinal mucosa (*mu*) is not involved (hematoxilin and eosin; ×4).

Table 1 Procedures Performed

	No. of patients
Bowel procedures	
Low anterior rectosigmoid resection with end-to-end anastomosis	68 (88.3)[a]
Disc excision of anterior rectal wall (Includes 1 segmental resection of ileum with end-to-end anastomosis)	5 (6.5)
Sigmoid resection	3 (3.9)
Partial cecum resection	1 (1.3)
Total	77 (100.0)
Gynecological procedures	
Conservative laparotomy, fertility preserved	39 (50.6)
Hysterectomy, bilateral salpingo-oophorectomy	29 (37.7)
Bilateral salpingo-oophorectomy (previous TAH)	2 (2.6)
Left salpingo-oophorectomy (previous TAH/RSO)	1 (1.3)
Resection of pelvic endometriosis (previous TAH/BSO)	6 (7.8)
Total	77 (100.0)

[a] Values in parentheses are percents.

ovarian remnant in the other 3. From the group of conservative surgery, 8 patients (20.5%) had to undergo TAH/BSO later because of recurrence of endometriosis, but none of these patients had apparent recurrence in the bowel as determined by visual inspection and palpation. Histologic confirmation was not obtained. In the early postoperative period, patients frequently had several bowel movements per day, but these were not ordinarily associated with pain or tenesmus. After some time, normal bowel habits resumed.

Complications included a patient who required an exploratory laparotomy 12 days after the bowel surgery because of persistent ileus and suspected adhesions. The only finding was a sterile collection of fluid in the pelvis. Another patient required subsequent surgery 2 weeks later for lysis of adhesions that were causing a small bowel obstruction; she did well postoperatively. The majority of our group of patients were passing flatus by day 3 or 4 and had three to four bowel movements before discharge. None of these patients developed intra-abdominal infection. Fever (38°C or more on two different occasions with an interval of at least 6 hours excluding the first 24 postoperative hours), presumed to be pulmonary in origin, was present in 8 patients (10.4%). The average length of postoperative stay in the hospital, determined by a complete return of the bowel function, was 7.4 days (range from 5 to 20 days). No patients had clinical evidence of anastomosis leakage.

Of 33 patients who desired pregnancy, 13 (39.4%) achieved a term pregnancy. One of the patients had two term pregnancies. The cumulative pregnancy rate in 33 patients who were attempting pregnancy was calculated using the Berkson-Gage life-table analysis method, which revealed a pregnancy rate of 34% at 18 months, and 52% at 29 months of follow-up (Fig. 3).

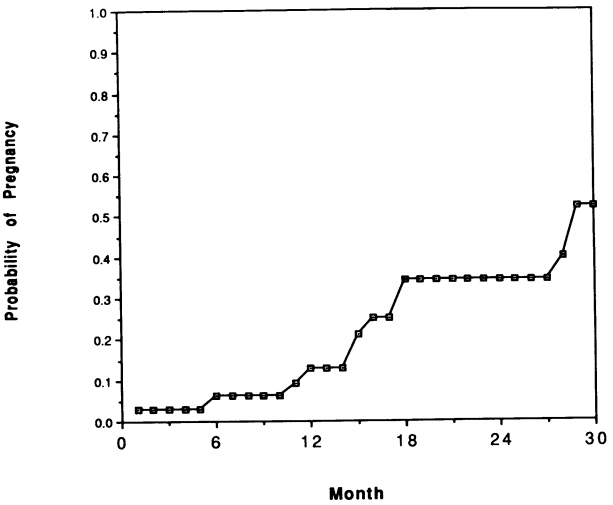

Figure 3 Probability of pregnancy in 33 patients treated with laparotomy and full-thickness colorectal resection for invasive endometriosis using the Berkson-Gage life-table analysis method.

DISCUSSION

A review of the literature reflects a lack of uniform management of patients with deep colorectal endometriosis.[7] For the most part, the physician handling endometriosis is a gynecologist, who does not have specialized surgical training in the management of bowel disease. When deep bowel involvement is encountered unexpectedly, the decision to enter the bowel lumen is difficult for three reasons: (1) the bowel is not prepared, (2) the gynecologist does not have experience with bowel surgery, and (3) some general surgeons consulted intraoperatively may have little experience with endometriosis. In the past, the options included either an inadequate "scraping" of the bowel, ignoring the diseased bowel while performing a TAH/BSO, or proceeding with bowel resection with a temporary colostomy. Bowel resection has been avoided in patients with deep endometriosis, but intestinal endometriosis may be responsible for the major symptoms that brought the patient to surgery. In 67 (87%) of our patients, a low anterior resection with primary anastomosis was carried out with no major complications related to the anastomosis.

The diagnosis of deep bowel involvement in endometriosis may be difficult to establish because loose stools are a common complaint at the time of menses, especially in patients with primary dysmenorrhea. Those symptoms that should arouse suspicion of deep bowel involvement include constipation alternating with diarrhea, rectal bleeding, rectal pain, tenesmus, dyspareunia, and dysmenorrhea. None of our patients had acute bowel obstruction because of endometriosis. Some patients have obstructive symptoms characterized by persistent and stubborn obstipation alternating with diarrhea. Chronic laxative use and futile attempts at management with a high-fiber diet occur frequently. These symptoms are caused by both inflammation and fibrosis associated with deep endometriosis. Endometriosis causes a sclerosing reaction in the bowel wall, which may cause kinking or narrowing of the bowel lumen. For this reason,

bowel symptoms may persist, even though the endometriosis may not be active. Only surgical resection can successfully treat the fibrosis. It is important to question specifically for these symptoms and their association with the onset of menses, otherwise bowel involvement may be overlooked. One should carefully palpate by rectal exam the uterosacral ligaments and posterior cul-de-sac, looking for nodularity and tenderness.

Deep bowel involvement should be suspected in every patient who has severe endometriosis. It has been estimated that 50% of patients with severe endometriosis have some degree of bowel involvement.[8] Our experience supports this. Every patient who has severe endometriosis should be considered for preoperative bowel preparation, so that definitive surgery may be carried out at the time of the initial laparotomy.

Because of our experience with the use of preoperative danazol increasing the pregnancy rate in patients with severe endometriosis, supported by Buttram and Reiter,[9] we chose to use it in those patients who wished to conserve childbearing. These patients received danazol 800 mg/d for 3 months before surgery. Not only does the amount of endometriosis decrease, but danazol reduces the capillary bed, which further improves results by decreasing bleeding and the risk of postoperative adhesions.[10] In this group of patients, the operation was carried out while the patient was still on danazol therapy. We utilized postoperative danazol in patients who had large endometriomas removed from the remaining ovaries. In 1981 Wheeler and Malinak[11] reported improvement in pregnancy rates in patients who had severe endometriosis treated by conservative surgery followed by postoperative danazol therapy. Danazol is a useful adjunctive measure to surgical therapy, but controversy remains regarding the timing and duration of its use.

No patient in this series underwent a complete pelvic reperitonealization. A peritoneal shelf was formed behind the uterus to prevent the ovaries and fallopian tubes from dropping into the cul-de-sac.

Although our study does not include a comparison group, we believe that a complete resection of deep endometriosis implants, including bowel endometriosis, should be performed even in patients having both ovaries removed.[12] This recommendation is supported by several lines of evidence. Our finding that remnant ovarian tissue was present in three of the six patients who had a previous TAH/BSO, suggests that it is sometimes difficult to excise the ovaries completely without taking the adjacent peritoneum, ureter, or bowel. In the past, when deep endometriosis involved organs such as the bowel, the ovaries were removed with the hope that the remaining implants would regress. Unfortunately, lack of ovarian steroids because of surgery or menopause does not necessarily cause regression of an established lesion or the sclerotic reaction associated with active or inactive lesions.[13] A review of 1,000 cases of active endometriosis, corroborated by both surgery and tissue study, revealed 29 patients with surgical menopause and 39 patients with at least 2 years of natural menopause at the time of diagnosis.[14] Finally, patients having surgery for endometriosis will be exposed to estrogen, either ovarian, exogenous replacement therapy, or peripheral conversion of androgens to estrogens. Residual endometriosis, when stimulated by these estrogens, can cause a rapid return of symptoms.[2,8,15–19] Persistent symptoms can also be caused by the sclerosing type of scarring left by a large nodule of endometriosis in the bowel wall, which may cause malfunction or narrowing in that segment of the bowel.

Success in treatment of endometriosis can be assessed by several means: pregnancy rate after therapy, relief of symptoms, and recurrence of disease. Based on our finding of a 39.4% pregnancy rate, deep colorectal endometriosis treated with bowel resection does not preclude pregnancy. Relief of symptoms in our patients was adequate, with 88% having complete or partial relief. Patients having removal of all ovarian tissue had better symptomatic relief, with all patients reporting either complete or satisfactory improvement. These results compare favorably with those reported in patients having a conservative laparotomy alone for endometriosis.[15,20] Recurrence of disease may only be determined by reoperation. Whereas second look laparoscopy is being done in some cases, its routine use is not of proven benefit. Eight of our patients underwent reoperation for recurrent pelvic symptoms. In none of these patients was there evidence, grossly either by visualization or palpation, of recurrent bowel endometriosis. We felt that there was no indication to confirm these negative findings by biopsy.

Postoperative hormonal replacement following castration and surgery for extensive endometriosis presents a challenging decision. Some authors recommend delay of estrogen replacement until symptoms of estrogen deficiency become evident and

then replace estrogen in the lowest dosage that relieves symptoms.[8] Leaving young patients castrated without estrogen replacement often leads to vasomotor symptoms, an increased risk of osteoporosis, target organ atrophy, and disruption in emotional stability. We therefore suggest complete excision of endometriosis, pelvic and/or intestinal, to relieve symptoms and allow subsequent estrogenic effects.[15] Since complete excision of endometriosis is performed in our patients, we give postoperative low-dose estrogen with progestin added on an individual basis. Androgens are also used in selected patients.

We can recommend resection of bowel involved with deep endometriosis as a definitive low-risk operation when an experienced surgical team is available. Alternatively, if experience with bowel surgery is lacking, less extensive procedures may be appropriate. The philosophy of resection of deep colorectal endometriosis requires a low instance of complications that can be accomplished with a satisfactory result if the technical points, which we have emphasized above, are observed. We have found that this surgical approach is safe, has low morbidity, good postoperative relief of symptoms, and favorable pregnancy rates.

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REFERENCES

1. Sampson JA: Intestinal adenomas of endometrial type. Arch Surg 5:217, 1922
2. Gray LA: Endometriosis of the bowel: Treatment by excision or castration. South Med J 58:815, 1965
3. Williams TJ, Pratt JH: Endometriosis in 1,000 consecutive celiotomies: Incidence and management. Am J Obstet Gynecol 129:245, 1977
4. Bailey HR, La Voo JH, Max E, Smith KW, Hampton JM: Single-layer continuous colorectal anastomosis. Aust NZ J Surg 51:473, 1981
5. Goligher JC, Graham NG, De Dombal FT: Anastomotic dehiscence after anterior resection of rectum and sigmoid. Br J Surg 51:473, 1981
6. Macafee CHG, Green HLH: Intestinal endometriosis. A report of 29 cases and survey of the literature. J Obstet Gynecol 67:539, 1960
7. Weed JC, Ray JE: Endometriosis of the bowel. Obstet Gynecol 69:727, 1987
8. Kistner RW: Endometriosis. In Gynecology and Obstetrics, Edited by TW McElin, JJ Sciarra. Hagerstown, Harper & Row, 1981, p 1
9. Buttram VC, Jr, Reiter RC: Endometriosis. In Surgical Treatment of the Infertile Female. Baltimore, Williams & Wilkins, 1985, p 89
10. Buttram VC, Jr, Belue JB, Reiter R: Interim report of a study of danazol for the treatment of endometriosis. Fertil Steril 37:478, 1982
11. Wheeler JM, Malinak LR: Postoperative danazol therapy in infertility patients with severe endometriosis. Fertil Steril 36:460, 1981
12. Forsgren H, Lindhagen J, Melander S, Wagermark J: Colorectal endometriosis. Acta Chir Scand 149:431, 1983
13. Lees DH: Severe endometriosis of the lower sigmoid colon and rectum. J Obstet Gynaecol Br Cwlth 73:267, 1966
14. Henriksen E: Endometriosis. Am J Surg 90:331, 1955
15. Gray LA: Endometriosis of the bowel: Role of bowel resection, superficial excision and oophorectomy in treatment. Ann Surg 177:580, 1973
16. Kempers RD, Dockerty MB, Hunt AB, Symmonds RE: Significant postmenopausal endometriosis. Surg Gynecol Obstet 111:348, 1960
17. Grunert GM, Franklin RR: Management of recurrent endometriosis. In Endometriosis, Edited by EA Wilson. New York, Alan R Liss, Inc., 1987, p 173
18. Ryley TG: Endometriosis of the bowel. Can Med Assoc J 75:15, 1956
19. Punnonen R, Klemi PJ, Nikkanen V: Postmenopausal endometriosis. Eur J Obstet Gynecol Reprod Biol
20. Garcia C-R, David SS: Pelvic endometriosis: infertility and pelvic pain. Am J Obstet Gynecol 129:740, 1977