



# Surgical laparoscopic treatment of bowel endometriosis with transvaginal resection of the rectum using ultrasonically activated shears: a retrospective cohort study with description of technique

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## Abstract

**Background** To assess the results of laparoscopic surgical treatment of bowel endometriosis with transvaginal resection of the rectum employing ultrasonic energy retrospective study.

**Method** 100 patients with symptoms of narrowing or partial obstruction of colon were submitted to laparoscopic resection of rectosigmoid tract through a vaginal route. Length of surgery, blood loss, histopathological extent of rectal invasion, surgical complications, and length of hospital stay were the main analyzed outcomes.

**Results** Mean operative time was 281 min, blood loss was 250 ml on average, length of stay was 8 days, bowel movements were after 3.5 days, the mean length of bowel-resected segments was 13.3 cm, the disease was multifocal in 64% and multicentric in 36% of surgical specimens.

**Conclusion** Laparoscopically assisted vaginal resection of rectosigmoid colon affected by endometriosis using ultrasonically activated shears with mechanical intestinal anastomoses tension free is a safe and effective procedure for surgical management of severe pelvic endometriosis with bowel involvement.

**Keywords** Endometriosis · Laparoscopic · Resection · Bowel

## Introduction

Deeply infiltrating endometriosis (DIE) defined as any lesion exceeding 5 mm occurs in 30–40% of the patients with endometriosis [11] and bowel infiltration may be observed in up to 50% of the patients with advanced stages of the disease [10]. Deep endometriosis is defined as endometriosis involving the bowel only if the muscularis layer is affected [14]. The most common sites of intestinal endometriosis include the rectosigmoid (73%) and rectovaginal septum (13%) followed by cecum, and appendix [9]. When the ileum is involved, the most common tract is the distal part. Intense dysmenorrhea, pelvic pain, deep dyspareunia, pain when evacuating with anal bleeding during menstruation

are the symptoms reported [3], but the majority of patients do not report rectal bleeding and involvement of the bowel mucosa is rarely found by rectosigmoidoscopy [7]. Medical approaches are unsatisfactory and no available drug eradicates endometriosis with symptom recurrence as high as 76% [13]. Many agents produce temporary relief of symptoms, but none has yet been shown to achieve a long-term cure and recurrence of pain is common when therapy is discontinued [12]. Even though surgical treatment is recommended as a first-line treatment for DIE, this deeply infiltrating disease is generally treated inadequately by gynecologists who are not properly trained in bowel surgery. Some surgeons perform total abdominal hysterectomy with bilateral oophorectomy to avoid bowel surgery but this does not cure patients. Currently, there is no agreement on the extent of resection that is necessary for this disease. Rectal surgery performed by laparoscopic, laparotomic, transvaginal or combined approach depend on the degree of involvement of the rectum with endometriosis; partial thickness resection, full-thickness disc resection, segmental resection with end to end stapled

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**Table 1** Patients

	Mean	Range
Ages	32.6	25–44
BMI	22.35	17.34–25.60
BMI in previous surgeries	23.28	18.38–35.55
BMI in no-surgery patients	21.72	17.35–37.10

**Table 2** Patients Characteristics and Symptoms

	%
Previous surgeries	56
Dysmenorrhea	66
Dyspareunia	53
Dyschezia	15
Abdominal pain	5
Pelvic pain	38
Infertility	25
Nulliparous	84
Asymptomatic	10

anastomosis are the classical techniques used. In the past, treatment of the affected gastrointestinal tract generally required conversion to conventional surgery. The aim of this study was to describe our technique and to assess the results for laparoscopic resection of rectosigmoid colon involved by endometriosis through a vaginal route.

## Patients and methods

From January 1999 to May 2014, 1434 patients underwent surgical treatment of all type of endometriosis in the Department of Obstetrics and Gynecology of the University of Brescia, 7% (100 patients) of that underwent bowel resection due rectosigmoid endometriosis (Tables 1, 2). Patients were admitted to the hospital on the day before the surgery. Indication for surgery were symptoms of narrowing or partial obstruction of the colon and/or chronic pelvic pain. Each patient underwent a routine gynaecologic and rectovaginal examination, transvaginal ultrasound, MRI with particular T1-weighted and colonoscopy. Age ranged from 25 to 44 (mean 32.6), 84 pts (84%) were nulliparous and 56 pts (56%) had previous surgery for endometriosis (40/56 laparoscopy and 16/56 laparotomy). Before surgery, each patient underwent mechanical bowel preparation and received perioperative intravenous antibiotics.

The patient was placed in the dorsolithotomy position with arms tucked at her side in a 20 degree Trendelenburg position. A Foley catheter was placed in the bladder marked with a methylene blue solution and uterine manipulator was inserted. Pneumoperitoneum was induced with gasless

technique employing an optic trocar (Optiview or, recently, Xcel Ethicon) inserted through an umbilical incision. Three ancillary trocars were placed: one 5 mm in the midline and one in each iliac fossa (5 mm on the left side and 10 mm on the right side). Harmonic Scalpel made by Ultracision is the system used for cutting and coagulating tissues. The preliminary step is adhesiolysis, if adhesions were seen between colon and parietal peritoneum. The peritoneum overlying the psoas muscle was incised from the round ligament to the base of the infundibular pelvic ligament, the retroperitoneal space accessed and the external iliac artery and vein clearly delineated. Exposure of the left common iliac artery and medial dissection reveal the ureter crossing over. After the broad ligament is opened and the ureter is dissected at the pelvic brim, the pararectal space is formed through the holy plane of heald. The parasympathetic fibers reaching the inferior hypogastric plexus were visualized and lateralized performing the nerve sparing. The internal iliac artery is visualized and the ureter is followed to the cross with the artery near the junction of the uterosacral complex. The medial leaf of the broad ligament is left intact. It is at this point that previously performed ureteral dissection enables a safe approach as the ureters are easily visible and lateral to the area of dissection. Previous right-basculated patient's position, right mesosigmoid incision were performed at aortic bifurcation level with exposition of the Gerota's plane.

The dissection was performed on the Toldt's fascia till splenic colic flexure. In this time were exposed left ureter and ovarian vessels. Inferior colic vessels on the corresponding mesocolon were ligated with metallic clips or obliterated and dissected with ultrasonic shears and the superior rectum was resected intracorporeally with EndoGia stapler. In 17 patients, the rectal resection was performed according to Valdoni's technique to preserve the arterial anatomy and sympathetic nerves along the inferior mesenteric artery. Colpotomy was performed at the level of the posterior vaginal fornix and the proximal stump with lesion is delivered through vaginal incision, a purse-string device is placed 2 cm upon the main lesion, the bowel segment resected and a detachable head assembly of the circular stapler is placed into the lumen. Reinsertion of the colon into the abdomen through colpotomy is followed by insertion of the circular stapler through the anus and colorectal anastomosis. In all cases, the anastomosis was performed within 5 cm from the linea pettinata. In 43 cases, partial posterior colectomy was performed to remove vaginal endometriotic nodules. At the end of the procedure, vaginal wall was sutured, the integrity of the bowel was checked by an underwater air leak test and pelvis washed with Betadine. Ultrasonic shears were used as the primary instrument for dissection and hemostasis. Commercially available ultrasonic shears (LCS-C5 or Ace Ethicon Endo—Surgery Inc.) was used at power levels 3 through 5. Lower power levels allowed coagulation, while

higher power levels facilitated faster transection of relatively avascular tissue. All specimens were sent for histological examination. No diverting ileostomy was performed.

## Results

Mean operative time was 281 min (range 140–390) and blood loss was 250 ml on average. There were four conversions to open surgery, one for important bleeding for laceration of inferior mesenteric artery, one for extensive adhesions, one for uncontrollable hypercapnia and one for massive bladder and ureteral involvement. Length of stay was 8 days (range 6–10). Patients had bowel movements after 3.5 days, on average. The mean length of bowel-resected segments was 13.3 cm. Only in three cases the colonic mucosa was involved. According to Kavallaris classification, [5] in 64 of surgical specimens we found multifocal disease and in 36 we found multicentric disease. No anastomotic leakage was observed. Two patients developed pelvic abscess that required interventional radiology drainage.

## Discussion

The treatment of intestinal endometriosis in most cases is surgical because expectant treatments (danazol, gonadotropin-releasing hormone analog agonist) generally are ineffective and reserved to patients who cannot be operated. Bowel endometriosis affects young women, without any co-morbidities and in particular without any vascular disorders [15]. The decision about which technique to use depends mainly on the extent and depth of the disease and colorectal endometriosis can be treated by local excision, ablation or bowel resection. The complete excision of all visible and palpable endometriotic lesions is the main objective of surgery but there is no consensus on the best way of achieving complete surgical removal of the affected tissue. Intestinal infiltration should be investigated by imaging methods and transvaginal ultrasound [2] with bowel preparation has shown a superior sensitivity (75–98%) for detecting DIE compared RM [17, 18] and is able to define not only the size and number of lesions but also the depth of invasion into the bowel wall and the distance from the anal verge [19, 20] Pre-operative assessment of bowel involvement can be helpful in establishing the appropriate surgical technique to offer patients the best treatment using the combined skills of the colorectal and gynaecologic surgical teams [8].

Superficial lesions on the serosa may be excised, fulgurated or vaporized with laser surgery but when the muscularis layer of the rectosigmoid is involved full-thickness disc excision or segmental resection are required [1]. These

surgical procedures may be associated with severe intra- or postoperative complications like anastomotic leak, fistulas, hemorrhage, infections, bladder and rectal dysfunction caused by pelvic denervation [4]; in addition, incomplete resection may lead to recurrence. In our series, all patients had involvement of the muscularis layer. In a recent study on histopathological extent of rectal invasion by rectovaginal endometriosis, Kavallaris reported 62% of multifocal disease (presence of endometriotic lesions within a 2 cm area to the main lesion) and 38% of multicentric involvement (when endometriotic lesions were found > 2 cm from the main lesion) in surgical specimens examined. This means that in more than one-third of patients, a distance of 2 cm from the main lesion is not sufficient to obtain clean margins and that conservative procedures like local excision or ablation do not guarantee complete removal of rectosigmoid colon endometriosis [5]. Furthermore, the retraction of the rectosigmoid colon over the adenomyotic nodules in the cul-de-sac frequently obscures the amount of disease and can result in incomplete excision [16]. Moreover, in our series, the extent of lesions and clinical finding of sub-occlusion did not recommend discoid resection and justify the extensive nature of the surgery undertaken. Laparoscopically assisted transvaginal procedure was first described by Redwine in 1996 [6]. In this technique, the affected loop of bowel is delivered vaginally to the introits, the affected segment is excised and the anastomosis is completed with a standard hand-sewn double-layer technique. In our technique, an endoscopic linear stapler is placed beneath the lesion, a linear resection is performed and the proximal stump with lesion is delivered through vaginal incision. This technique avoids enlarging of abdominal incisions for removing the surgical specimen that may cause hernia, infection, or pain with aesthetic advantages, while the use of mechanical anastomoses shortens the time of surgery. This procedure consents to perform a colorectal anastomosis tension free while the employment of ultrasonically activated shears avoids electrosurgical damages to organs and tissues. Good perfusion and no tension at the anastomosis site are essential when segmental resection is performed. Valdoni's technique can guarantee, in our opinion, better outcomes in terms of postoperative bowel function although randomized clinical trial comparing different surgical techniques are needed. The application of ultrasonic energy to endoscopic surgery offers advantages over the use of electrosurgery or laser surgery because, unlike electrosurgery, there is no electrical current in the surgical field. Heat generated is limited to temperatures below 80 °C minimizing the zone of thermal injury, produces little smoke and minimal tissue charring and dissection, leaving tissue planes and operative fields better visualized [21]. Furthermore, reduces possible occurrence of complication caused by lateral thermal spread and scattering power [22, 23]. After 2 years of follow-up, no intestinal

fistula was observed and in our series, complete resection resulted in no further bowel surgery for endometriosis. In our experience, operative laparoscopy is a safe and effective method to treat colonic endometriosis and a multidisciplinary approach is necessary to offer patients the best results.

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## Compliance with ethical standards

**Conflict of interest** Nothing to disclose about potential conflicts of interest.

**Informed consent** No informed consent needed for this study.

**Ethical approval** This article does not contain any studies with human participants or animals performed by any of the authors (only observational).

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