

# Surgery for Deep Endometriosis: Standardization of the Operating Technique

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## Abstract

**Background and objectives:** Deep endometriosis is a disease with a great negative impact on patient quality of life, requiring surgical treatment in tertiary centers and surgeons highly skilled in performing complex surgeries, and is associated with high rates of morbidity and related complications. We evaluated all cases of deep endometriosis operated by the same surgeon since 2011 to evaluate the profiles of patients, sites and organs affected, surgical indications and complications and to propose a standardization of the surgical technique used in our service.

**Methods:** Data were retrospectively collected from 54 patients diagnosed with deep endometriosis between 2011 and 2016 and included age, body mass index, symptoms, CA-125, affected sites, surgical route, surgical procedures performed, complications and pregnancy rate after surgery.

**Result:** The main complaint was pain without infertility in the majority (64%), and dysmenorrhea was the most common symptom. The main sites were intestine (70.4%), vagina (14.8%), uterosacral ligament and ureter (both with 5.6%) and bladder (3.7%). Of the 54 patients, 136 lesions of deep endometriosis were resected in 130 surgical procedures. Endometrioma was associated in 34 (63%) of the cases. Ten patients (18.5%) had some type of complication. Nine (60%) of the fifteen patients complaining of infertility were able to spontaneously become pregnant after surgery.

**Conclusion:** Surgery for deep endometriosis affects multiple structures and organs, resulting in a high degree of morbidity and high complication rates, and should be performed in tertiary centers with a multidisciplinary team and experienced surgeons, obeying standard surgical techniques.

**Keywords:** Deep Infiltrating Endometriosis; Laparoscopy; Surgery; Colorectal

**List of abbreviations:** Deep Endometriosis; Urinary Endometriosis; Bowel Endometriosis

## Introduction

Endometriosis is defined as the presence of endometrial tissue outside the uterine cavity, resulting in a chronic inflammatory reaction at these sites [1]. These ectopic endometrial implants are usually located in the pelvis but may occur in any area of the body [2]. Endometriosis can manifest in different ways among patients. Most patients with endometriosis have low-grade disease associated with mild or moderate symptoms. Typically, these patients have implants in the ovaries, serous surfaces or superficial peritoneal disease [3-5]. In some cases, endometriosis manifests more aggressively with lesions that deeply infiltrate the pelvic structures and organs. These patients present more severe degrees of pain and clinical manifestations, great negative impact on quality of life and serious complications if they are not treated [6]. Deep endometriosis is defined as the infiltrative forms of endometriosis that affect the fundus of the sac and the rectovaginal septum, uterosacral ligaments and vital structures such as intestine, bladder and ureters [7,8]. Unlike superficial forms of the disease, deep infiltrative endometriosis (DIE) is a peculiar form that does not respond well to drug therapy and generally requires extensive and aggressive surgery that must be performed by an experienced professional using specific techniques [5,9]. This study describes the cases of deep endometriosis of patients surgically treated by an experienced gynecologist and multidisciplinary team in tertiary services in Porto Alegre, RS, defining the clinical and epidemiological profile of these patients and the affected sites and organs, surgical indications, complications and postoperative outcomes, proposing a standardization of the operative technique to be followed in all cases.

## Materials and methods

Data collection through medical chart review was approved by the Ethics and Research Committee of Hospital Nossa Senhora da Conceição. We included all 54 patients diagnosed with DIE, operated on by gynecologist Dr. Limberger from 2011 to 2016, attended at the Nossa Senhora da Conceição, Ernesto Dornelles, Mãe de Deus and Moinhos de Vento hospitals, all of which are located in Porto Alegre-Rio Grande do Sul. We consider deep endometriosis to include the infiltrative forms of endometriosis that affect the rectovaginal septum, uterosacral ligaments, fundus of the vaginal sac and vital structures such as intestine, bladder and ureters, confirmed by anatomopathological examination. For each patient, demographic data, such as age, number of children, body mass index (BMI) and comorbidities, were collected. Previous history of hormone treatment and surgery for diagnosis or treatment of endometriosis were recorded. The following symptoms were identified from the clinical chart: chronic pelvic pain (not related to the menstrual cycle), dysmenorrhea (pelvic pain or colic during the menstrual period), dyspareunia (pain during intercourse), gastrointestinal symptoms during menstruation (dyschezia, hematochezia and diarrhea or constipation) and urinary symptoms also during the menstrual period (hematuria, dysuria, urinary urgency and bladder tenesmus). In view of the described symptoms, we considered four main indications for surgery: pain with infertility, pain without infertility, infertility without pain or asymptomatic hydronephrosis. According to surgical descriptions and anatomic-pathological reports, we reviewed and classified endometriosis lesions located at five main sites: bladder (a lesion that infiltrates the actual bladder muscle), ureter (a lesion that infiltrates the ureter wall), uterosacral ligament (a lesion that infiltrates the uterosacral ligament, either uni- or bilaterally), vagina (when the lesions infiltrate the fundus of the anterior rectovaginal sac, the posterior vaginal fornix or the retroperitoneal region between the anterior vaginal sac and the posterior vaginal fornix) and intestine (a lesion that infiltrates the actual intestinal muscle). When the patient had multiple locations of deep endometriosis, she was classified according to the category corresponding to the most severe main lesion. According to the definition, we classified the lesions from the least severe to the most severe in the following order: uterosacral ligament (USL), vagina, bladder, intestine, and ureter. For patients with intestinal involvement, we divided the disease into the following locations: straight, rectosigmoid, sigmoid colon, ileo-cecum, appendix and small intestine. The presence of associated ovarian endometrioma was also evaluated. The surgical routes used, i.e., abdominal (laparotomy) and video laparoscopic, were analyzed. Each surgical procedure specific to the different locations of deep endometriosis was recorded according to the surgical description. Postoperative complications were reviewed and described, and for those patients who had surgical indication for infertility, we described those that managed to become pregnant after the procedure. Because the patients were treated by the same surgeon and multidisciplinary team, we were able to systematize and standardize the surgical technique in all cases. Our service has adopted the following routine. The patient is prepared with an enema. Under general anesthesia, the patient is placed in the modified Lloyd-Davies position (lithotomy). Bladder catheterization is performed, and the uterine manipulator is placed. Pneumoperitoneum is established using a Veress needle through a supra-umbilical longitudinal incision with a pressure of 15 mmHg. The operation starts in the Trendelenburg position (with 20° slope), and 5-mm trocars are then inserted in the right iliac fossa, left iliac fossa and the middle third between the umbilicus and the pubic bone. The first step is diagnosis with thorough inventory of the abdominal cavity and understanding of the problem. The second step is to re-establish the anatomy by releasing the sigmoid colon, adhesions and cystic drainage, thus allowing adequate exposure of the pelvis. The ureters are then released from the iliac vessels up to their entry into the bladder, with identification of the hypogastric nerves along the uterosacral ligaments and the lower hypogastric plexus. Opening of the pararectal spaces is then performed, allowing the reassessment of structures compromised by the foci of endometriosis including the bladder, ureters, intestine, uterosacral ligaments, vagina and uterus. In patients with less than 30% of the rectum involved, the nodule is resected, respecting the depth of invasion, by *shaving* or discoid resection. When the invasion is superficial, nodule resection alone is adequate. However, when the invasion is deeper or a rectal opening or an impression of residual lesions on the intestinal wall is present, continuous suturing of the area is performed with prolene 2-0, an endoluminal circular stapler is introduced with its payload attached via the rectum, the stapler is opened, and the suture is drawn into the stapler, which is closed and fired, completing the discoid resection and closing the opening in the rectum. In cases of endometriosis of the rectovaginal septum, this approach is performed via the vagina because the vagina is open for resection of the nodule. In cases of concomitant endometriosis infiltrating the sigmoid colon with a need for incision for removal of a larger surgical specimen, a suprapubic transverse incision approximately 7 cm in length is created, followed by insertion of an Alexis® wall retractor, prepared with the glove hand and latex aspiration tube, and resection and manual extracorporeal sutures are performed. The ventilator test is performed, and air insufflation via the rectum and possible extravasation of air in the pelvis filled with saline solution is observed. At the end of surgery, the chromotube test with patent blue is performed in patients with infertility, followed by hemostasis, cavity lavage with saline solution and portal closure.

## Results

During the analyzed period, 54 women underwent surgical treatment for deep endometriosis. The data, symptoms and previous treatments undergone by the patients are summarized in (Table 1). According to the severity of the lesions, the main sites affected in order of frequency were intestine (70.4%), vagina (14.8%), uterosacral ligament and ureter (both with 5.6%) and bladder (3.7%). These 54 women had 136 DIE lesions, confirmed by anatomopathological examination, with anatomical distribution described in (Table 2). As we observed in the distribution of lesions due to deep endometriosis, the main site of involvement was the intestine. Of the 54 patients, 38 (70.3%) had involvement of any site of the intestinal tract of the 38 patients with endometrioid lesions in the intestine, 14 (36.8%) had more than one intestinal lesion. The distribution of lesions in the intestine in ascending order of

frequency was as follows: small intestine (n = 1, 1.6%), appendix (n = 4, 6.4%), sigmoid colon (n = 4; 6.4%), ileo-cecum (n = 7; 11.2%), rectosigmoid (n = 15; 24.1%) and rectum (n=31; 50%). Of the 54 patients with deep endometriosis, we observed that 34 (63%) had associated endometriomas (either uni- or bilaterally) and required oophoroplasty during the surgical procedure for resection of these lesions. Among the surgeries performed, the majority (n = 37; 68.5%) were performed by video laparoscopy and 16.7% (n = 9) by laparotomy. In 8 cases (14.8%), the surgery started using video laparoscopy but had to be complemented by laparotomy due to the absence of adequate surgical material in the institution. The surgical procedures performed for the excision of DIE lesions are described in (Table 3). Of the 54 patients submitted to surgery, a total of 130 surgical procedures were performed. In our series, we observed that 10 (18.5%) patients had complications associated with the surgical procedure, with the most common being primary anastomosis dehiscence with need for protective ileus/colostomy, followed by bladder dysfunction with associated urinary retention, hematoma and pelvic abscess. Of all of the patients, 3 (5.6%) had recurrence requiring a surgical reintervention to remove new deep lesions of endometriosis. We considered as recurrence those cases in which the patients had evidence on ultrasound and/or magnetic resonance imaging and underwent a new surgery with the diagnosis of endometriosis confirmed in the pathology examination. The surgical indication was clinical worsening in all three cases. One patient had recurrence on the colostomy scar (subcutaneously) and endometriomas bilaterally at 3 years after the first surgery. In the second case, recurrence occurred 2 years after primary surgery, and a rectosigmoidectomy and appendectomy were performed, probably due to permanence of endometriosis foci in the intestine due to a less aggressive surgery on the first approach. The third case was a patient who had undergone two previous surgeries in other hospitals for endometriosis, who was operated on by our team in 2014 for resection of intestinal endometriosis and one year later underwent hysterectomy with bilateral salpingectomy for persistent and disabling pelvic pain. Foci of endometriosis were observed in the left fallopian tube and fragments of the left ovary. Of the 15 patients who complained of infertility associated or not associated with pain, 9 (60%) became pregnant spontaneously after surgery, and 6 (40%) were not able to conceive one year after the surgical procedure.

Patient characteristics (n = 54)	
Age (years) <sup>a</sup>	36.4±7.0 (23-53)
BMI (kg/m <sup>2</sup> ) <sup>a</sup>	24.7±3.9 (17-37)
Number of prior pregnancies <sup>a</sup>	0.6±0.8 (0-3)
Prior treatment for Endometriosis (%)	
Hormonal	87
Surgical	53
Main complaint (%)	
Pain without infertility	64.9
Pain and infertility	9.3
Infertility without pain	25.9
Painful symptoms (%)	
Chronic pelvic pain	46.3
Dysmenorrhea	53.7
Dyspareunia	20.4
Gastrointestinal symptoms	33.4
Cyclical urinary symptoms	5.6
CA-125 (U/ml) <sup>a</sup>	55.1±70 (9-352)
Data are presented as means ± standard deviations (minima-maxima). BMI: body mass index	

**Table 1:** Characteristics of women with deep infiltrative endometriosis

Site	n (%)
LR	6 (4.4)
AUS/UVPR	11 (8)
USL	27 (19.8)
Vagina	25 (18.3)
Bladder	2 (1.4)
Intestine	62 (45.5)
Ureter	3 (2.2)
Total	136 (100)
LR: Round Ligament; SUA / RVPU: Anterior Uterine Serosa / Uterine Vesicle Peritoneal Reflection; USL: Uterosacral Ligament;	

**Table 2:** Anatomical distribution of the main lesions reported in the description of the surgical procedure

Procedures performed (n = 130)	n
Anterior compartment	
Resection of the round ligament (uni- or bilateral)	6
Resection of the superficial uterine peritoneum	9
Partial cystectomy	2
Replacement of the ureter	3
Posterior compartment	
Resection of the uterosacral ligament (uni- or bilateral)	25
Nodule resection at the rectovaginal septum	24
Rectal <i>shaving</i>	21
Discoid resection at the rectum	9
Segment resection at the rectum	6
Segment resection at the rectosigmoid colon	14
Ileocecal resection	6
Segment resection at the small intestine	1
Appendectomy	4
Total	130
<sup>a</sup> Sometimes more than one procedure was performed in the same patient.	

**Table 3:** Surgical procedures for treatment of deep infiltrative endometriosis

## Discussion

Our data and data from the literature suggest that lesions of infiltrative endometriosis tend to be multifocal in most patients and that a large number have intestinal involvement [10-13]. We also observed that the majority (63%) of patients with DIE had associated endometriomas. The main complaint of patients seeking care was pain. Although our study is retrospective and the evaluation of pain was not standardized as it would be in a questionnaire, the main pain symptoms were similar to those described in the literature, the most frequent being dysmenorrhea, acyclic pelvic pain, cyclic gastrointestinal symptoms, dyspareunia and urinary symptoms; most of the patients complained of more than one painful symptom [11,14]. In the distribution of patients according to the most severe DIE lesions, we observed a larger number of patients with intestinal involvement (70.4%) and fewer with involvement of the uterosacral ligament (5.6%) than previously reported in the literature. The percentages of patients with primary lesions located in the vagina (14%), bladder (3.5%) and ureter (7.5%) were similar to those reported in other studies [10-13]. In the cases of endometriosis with intestinal involvement, the majority of the patients in our study had involvement of the rectum and rectosigmoid junction (74.1%), followed by the ileo-cecum (11.2%), sigmoid colon (6.4%), appendix (6.4%) and small intestine (1.6%), similar to findings from other studies [12,15]. When deep endometriosis affects the rectosigmoid, multifocal intestinal lesions are observed in 40% or more patients, a number similar to the 36% found in our study [16]. Because the disease involves a complex pathology that requires extensive aggressive surgeries for complete excision of its lesions, the rates of postoperative complications described for deep endometriosis surgery are high, varying from 10 to 15% in the literature, especially when they reach the urinary and/or intestinal tract [17-20]. In our study, ten patients (18.5%) had postoperative complications, the majority (4 cases) related to anastomosis dehiscence requiring temporary protective ileus/colostomy, and 3 of them had reconstructed intestinal transit. Other complications were bladder dysfunction with a need for self-catheterization for a limited time, pelvic hematoma and abscess. There were no intraoperative complications, and conversions performed for laparotomy (n = 8; 14.8%) were due to the absence of adequate surgical material available at the institution. Conversion rates in the literature range from 2-12.5% [19,21]. Recurrence rates range from 2 to 43.5% according to the literature. This variability is due to different definitions for recurrence and the short segment time. A longer segment time results in greater recurrence rates [22]. Three of the fifty-four patients (5.6%) had recurrence in our study, and the segment time ranged from 5 years for patients operated on in 2011-2012 to 1 year or less for patients operated on in 2016. Young age and high BMI are risk factors for recurrence [22]. The three patients who suffered recurrence were operated on before July 2013 (4 or more years of follow-up), and only one was obese (BMI 33). In a Cochrane systematic review, the authors concluded that laparoscopic surgery to treat endometriosis reduces overall pain and increases pregnancy and live birth rates [23]. Our study showed a general and subjective improvement of painful symptoms among our patients after the surgery, but we were unable to investigate further due to the lack of applied questionnaires in this retrospective study. Of the patients complaining of infertility, 60% managed to spontaneously get pregnant after surgery for endometriosis, a number similar to those described in the literature, which range from 50 to 60% [17,24]. The aim of the surgical treatment for deep endometriosis is the complete excision of all lesions [16]; the procedures should be performed by experienced surgeons and by a multidisciplinary team [24]. In our series, all 54 patients with deep endometriosis were operated upon in a tertiary center by the same gynecologist, and in all cases of intestinal or urinary tract involvement, a coloproctologist or urologist surgeon participated, all with extensive experience and training in video laparoscopy.

The choice of surgical technique should be individualized in each case according to the location, size and quantity of lesions, and in cases of multifocal disease, several surgical procedures should be combined [9,16,23,25]. We performed 130 surgical procedures for the treatment of DIE cases in our study. Except for one patient operated on in the year 2011, the remaining 53 patients were operated on in a 5-year period (2012-2016), resulting in an average of 10 patients per year (7-17). The small size of our sample and the fact that it is a retrospective study evaluating surgeries performed during a 5-year period are the main limitations of our study, although our results are similar to those described in the literature by several other centers in several countries around the world. Although each case requires individualized planning, we conclude that there should be standardization in the surgical approach of these patients. Because surgery for deep endometriosis affects multiple structures and organs, resulting in a high degree of morbidity and high complication rates, it should be performed in tertiary centers with a multidisciplinary team and experienced surgeons, obeying standard surgical techniques.

## Conclusion

Surgery for deep endometriosis affects multiple structures and organs, resulting in a high degree of morbidity and high complication rates, and should be performed in tertiary centers with a multidisciplinary team and experienced surgeons, obeying standard surgical techniques.

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