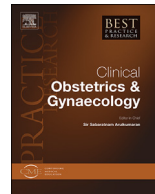




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# Best Practice & Research Clinical Obstetrics and Gynaecology

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## Choosing the right technique for deep endometriosis

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### A B S T R A C T

#### Keywords:

Deep endometriosis  
Rectal shaving  
Disc excision  
Segmental rectal resection

The surgical management of bowel endometriosis is a real challenge. In addition to the fact that only symptomatic patients should undergo surgery, no consensus has been approved in the literature.

Among the surgical techniques, the surgeon has to choose between rectal shaving, disc excision, or segmental colorectal resection. All those procedures are associated with complications, but the risk of rectovaginal fistula is higher if a disc excision or segmental colorectal resection is performed. It is therefore of utmost importance to evaluate preoperatively the bowel infiltration by several imaging techniques to estimate the feasibility of a deep rectal shaving with possible incomplete removal of the endometriotic lesions or to discuss with the patient about the indication of a segmental bowel resection. Because of the risk of major preoperative and postoperative complications, proper patient counseling is mandatory.

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### Introduction

Endometriosis is a benign gynecologic condition, histologically defined by the presence of ectopic endometrium outside the endometrial cavity. Three clinical presentations of endometriosis have been

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<https://doi.org/10.1016/j.bpobgyn.2019.01.010>

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described and could coexist in the pelvis: peritoneal endometriosis, ovarian endometriosis, and deep infiltrating endometriosis [1].

Endometriotic lesions extending more than 5 mm beneath the peritoneum are defined as deep infiltrating lesions and could be detected on the following pelvic structures or organs: the uterosacral ligaments, the vagina, the bowel, the bladder, and the ureters. Deep bowel endometriosis is defined by the infiltration of the muscular layer of the rectum, rectosigmoid junction or the sigmoid [2].

Endometriotic infiltration up to the bowel serosa is not considered as deep bowel endometriosis and therefore should not be treated surgically as such.

Deep endometriosis is frequently multifocal and usually affects the following structures: the uterosacral ligaments, the posterior vaginal fornix, the bladder, the ureters, and the digestive tract (rectum, recto sigmoid junction, ileum, and appendix). Approximately 3.8–37% of patients with endometriosis present intestinal involvement [3]. The main locations of intestinal endometriosis are, in order of frequency, the rectum and the recto-sigmoid (65.7%), the sigmoid (17.4%), the appendix (6.4%), the small bowel (4.7%), the cecum and ileo-cecal junction (4.1%), and the omentum (1.7%) [3,4]. Patients with colorectal endometriosis have complaints of diarrhea, dyschesia, bowel cramping, and dyschezia [3,4]. In 2005, Fauconnier and Chapron pointed out the relationship between pelvic pain and the location of deep endometriosis [5]. Particular characteristics of painful symptoms are specifically associated with precise anatomical locations or organs, and semiological analysis of the pain symptoms could help the surgeon to define the surgical strategy.

During gynecological examination, the palpation of a fibrotic nodule in the posterior vaginal fornix will allow the surgeon to suspect deep lesions. During this examination, the mucosal protrusion, the retraction, or the invasion has to be evaluated, as well as the extension of the fibrotic lesion to the pelvic sidewalls.

If the colorectal endometriosis is located at the recto-sigmoid junction, further in the pelvis, vaginal examination could be unremarkable, and additional investigations are required for its detection in case of classical symptoms. The treatment of colorectal endometriosis is a real challenge. Medical treatment, which permits the suppression of estrogen synthesis and atrophy of the endometriotic implants, is usually associated with significant side effects. However, if hormonal therapy alleviates symptoms such as dysmenorrhea, there is a high recurrence rate after cessation of the therapy. Histologically, colorectal endometriosis is characterized by hyperplasia of fibroblasts located in the muscularis layer of the bowel wall. This fibrosis is considered as a host tissue reaction to the presence of ectopic endometrial cells [6]. Fibrosis will not be affected by the hormonal therapy explaining the relative ineffectiveness of the medical treatment on other symptoms such as deep dyspareunia and dyschesia. No consensus has been reached in the literature concerning the surgical removal of colorectal deep endometriosis. However, all authors agree that only symptomatic patients should undergo surgery.

The aim of this manuscript is to describe the different approaches of colorectal endometriosis surgery, the associated complications, and the recurrence after surgery. According to these results, an algorithm for the management of symptomatic patients with bowel endometriosis is proposed.

### **Description of the surgical procedures of deep colorectal endometriosis**

Among the surgical techniques, 3 different procedures are described in the removal of colorectal endometriosis: the rectal shaving, the disc excision, and the segmental colorectal resection.

#### *Shaving*

Deep fibrotic nodular endometriosis involving the Douglas pouch requires its dissection from the posterior vagina, the rectum, the posterior cervix, and the uterosacral ligaments. As described by Reich et al., in 1988, attention is first directed toward a complete dissection of the affected area near the anterior rectum until the healthy tissue of the rectovaginal space is reached [7].

In the *standard technique*, shaving consists first in the separation of the deep nodule from the anterior part of the rectum. For this procedure, the pararectal spaces are longitudinally opened, medially from the uterosacral ligaments and as close as possible to the lateral side of the bowel to avoid injury to hypogastric nerves. Once the lateral sides of the rectum are free, rectal shaving is then

performed on the anterior wall of the rectum to allow the complete removal of the lesion. The latter can be obtained by mechanical dissection, use of cold scissors, or a low thermic energy source (CO<sub>2</sub> laser or Plasma) [8,9]. Rectal dissection should be continued until visualization of the healthy rectovaginal space. The nodule is then dissected from the posterior cervix, the uterosacral ligaments, and the vagina without or with opening the latter depending on its infiltration.

The *reverse technique*, a variation of the previous surgical procedure, consists on first freeing the nodule from the uterine cervix and the affected posterior vaginal fornix by using several types of energy [10]. After suturing the vaginal wall, the nodule, only attached to the rectal wall, is progressively dissected, thus avoiding entering the lumen of the rectum. If any evidence of deep damage of the muscular layer is observed, a suture is performed.

In conclusion, the classical or reverse shaving technique is possible even when anterior rectal wall muscle infiltration is observed. In case of muscularis defect after the endometriotic lesion removal, suturing the bowel in one layer by using absorbable stitches is recommended.

However, using this technique in case of deep endometriotic lesions, infiltration of the muscularis may result in incomplete excision of the lesion, and it should be explained to the patient preoperatively.

#### *Disc excision*

If rectal wall is still infiltrated by implants of deep endometriosis after the shaving technique, a full-thickness disc excision of the shaved area may be performed, followed by suturing the defect in one or two layers.

Disc excision can be performed by using transanal staplers (semicircular staplers or end-to-end circular staplers) or directly through the vagina when opened to remove vaginal infiltration [11,12].

Before performing a disc excision, the extent of bowel lumen shrinkage has to be evaluated [13]. Indeed, a correlation between the depth of bowel infiltration and the circumference of the bowel affected by the disease has been described. If deep endometriosis involves the rectum and/or sigmoid deeper than the submucosal layers, the circumference of the bowel affected by the disease is higher than 50% [13]. In such circumstances, removal of a disc that compromises 40% of the circumference of the rectum increases the risk for postoperative stenosis.

#### *Segmental colorectal resection*

Rectal dissection is carried out following the steps described above. Mobilization of the rectum is carried out at least 20 mm below the rectal nodule. Section of the mesorectum and the mesocolon is performed in contact with the posterior wall of the rectosigmoid. The stapler is entered into the peritoneal cavity through the inferior right trocar, and the rectum is then distally sectioned. Mini laparotomy of 4 cm is performed through a transverse suprapubic section (Pfannenstiel incision) or at inferior left trocar location. After extraction of the rectal stump, resection of the rectal or the rectosigmoidal endometriotic nodule (depending on the disease extension) is performed. Section of the digestive tract is performed at an average of 20 mm above the palpable macroscopic nodule limits. Colorectal anastomosis is performed by using an end-to-end anastomosis transanal stapler of 28–31 mm in diameter.

At the end of the procedure, the rectal air test allows to control the quality of colorectal suture and the absence of fistula. A diverting stoma may temporarily be created in patients with concomitant rectal and vaginal suture.

In summary, surgery for deep endometriosis is complex and challenging and will often benefit from a multidisciplinary team (gynecologist, colorectal surgeon, and urologist). The procedure requires dissection of the para rectal spaces; ureterolysis, when needed; vaginal wall resection, if the vaginal mucosa is infiltrated; and rectal dissection with or without rectal surgery depending on the rectal infiltration [14,15].

#### **Complications of surgical procedures**

Among the types of complications, we have to distinguish between minor and major complications as described by Clavien-Dindo, such as recto vaginal fistula, anastomotic leakage, pelvic abscesses, and

postoperative bleeding [16]. A distinction is also to be made between early and late complications such as bowel stricture; intestinal obstruction or sub occlusion by adhesions; and bowel disorders including chronic constipation, difficult intestinal emptying, and chronic diarrhea.

The surgical management of deep endometriosis is associated with a significant risk of major postoperative complication [17]. A national snapshot of the surgical management of deep infiltrating endometriosis of the rectum and colon has been performed in France including a total of 1135 patients from 56 health care facilities. Rectal shaving was performed in 48.1% of cases, disc excision in 7.3%, colorectal segmental resection in 40.4%, and sigmoid colon segmental resection in 6.4%. Clavien-Dindo 3b complications such as anastomotic leakage occurred in 0.8% of cases, pelvic abscess in 3.4%, and rectovaginal fistula in 2.7%. The rate of rectovaginal fistula in patients managed by disc excision (3.6%) or segmental resection (3.9%) was noted to be 3 times higher than the rate described in patients who underwent the shaving (1.3%). In this study, Clavien-Dindo complication type 4 was unfortunately reported in one patient who died after rectal shaving.

Among a series of 568 women undergoing surgery for deep endometriosis, Kondo et al. [18] observed a conversion rate of 2.3% and postoperative major complications in 9.3%. In this large series, 40% of the patients underwent rectal surgery as follows: rectal shaving was performed in 32.2% ( $n = 183$ ), excision of rectal lesion and suture in 3% ( $n = 17$ ), and segmental bowel resection in 4.4% ( $n = 25$ ) [18]. The rate of major postoperative complications was found to be lower in the shaving group (6.7%) than in the segmental resection group (24%). According to these results, the authors concluded that surgery for deep endometriosis is associated with major complications regardless of the type of rectal surgery.

Concerning the shaving procedure, the rate of major postoperative complications was also noted to be lower when the reverse technique is used (5%) than when the standard technique is used (22.9%) [18].

In a systematic review of 49 studies of surgical complications of deep endometriosis with colorectal involvement, Meuleman et al. [15] described that in the bowel resection anastomosis group ( $n = 2036$  patients), postoperative bleeding occurred in 3.1%, rectovaginal fistula in 2.7%, anastomotic leakage in 1.5%, and abscesses in 0.34%. When a mixed surgical group was analyzed ( $n = 1799$  patients), the rate of complications was found to be low. Indeed, postoperative bleeding, rectovaginal fistula, leakage, and abscesses were noted in 0.3%, 0.7%, 0.7%, and 0.3% of patients, respectively. The authors concluded that complication rate was related to bowel resection and also to additional surgery as associated deep lesions were also treated.

Concerning the risk of bowel dysfunction after radical or conservative surgical technique, Roman et al. described a reduced risk of postoperative constipation by comparing patients undergoing surgery according to their symptoms with patients undergoing radical approach. Indeed, the rate of colorectal resection was found to be low when a conservative philosophy was adopted [19]. In a series of 111 consecutive patients undergoing rectal disc excision by using transanal staplers (Contour Transtar stapler and end-to-end anastomosis circular transanal staplers), Roman et al. demonstrated an increase in the postoperative values of the gastrointestinal quality of life index and the prevention of low anterior rectal resection syndrome [20].

In a multicenter prospective cohort study of 4721 women undergoing a laparoscopic excision of deep rectovaginal endometriosis, Byrne et al. described a very low rate of perioperative and postoperative bowel complication [21]. Indeed, the rate of leakage and fistula were only noted in 0.4% and 0.3% of patients, respectively. Interestingly, in this study, the rate of radical surgery was very low as 37% of patients were not undergoing bowel surgery, 58% underwent a shaving, 1.1% a disc resection, and 3.8% a segmental resection.

In a retrospective study of 177 patients with deep infiltrating colorectal endometriosis, we evaluated the postoperative complication rate following two different surgical procedures: rectal shaving and segmental colorectal resection (personal data). We observed one leakage in a patient who underwent a rectal resection ( $n = 50$ ; 2%) and one ureteric damage in a patient of the shaving group ( $n = 127$ ). The leakage was diagnosed in the immediate postoperative period, and this Clavien-Dindo 3b complication has been explained by an excessive tension on the site of anastomosis probably due to insufficient intestinal mobilization.

## Recurrence

The definition of recurrence of endometriosis includes recurrence of endometriotic lesions associated with or without symptoms (infertility and pelvic pain).

The recurrence rate of pain after deep endometriosis surgery has been estimated to be 4% at 3 years and 8.7% at 5 years after shaving and 1.8% at 2 years after disc excision [22,23]. After colorectal segmental resection, the rate of recurrence is more difficult to estimate. In case of pain recurrence due to *de novo* formation of endometriotic lesions or to a regrowth of residual lesions, hormonal therapy should be the first-line treatment. Surgery should be performed only when pain persists even during the administration of hormonal therapy or in cases of complications related to the presence of deep endometriosis on the ureter and the bowel wall provoking an ureterohydronephrosis or a bowel stenosis, respectively.

The management of postsurgical pain recurrence with evidence of endometriosis will depend on the anatomic localization of the endometriotic lesion. For example, if recurrence is observed after bowel shaving, bowel endometriosis would probably require a bowel resection instead of a repeated shaving. In case of ureterohydronephrosis, ureterolysis could be performed as well as ureteral resection or ureteral transposition.

## Choosing the right technique

We could estimate that more than 70% of women with deep endometriosis still undergo segmental bowel resection [15].

Indeed, among the literature, there is no consensus about the best procedure to be proposed to patients suffering from deep colorectal endometriosis. Some authors advocate a radical approach to remove all the endometriotic lesions, whereas a more conservative management is proposed by other teams.

First, we have to keep in mind that endometriosis is a benign condition. Indeed, even the molecular characteristics of endometriotic cells are similar to those of cancerous cells, such as adhesion, proliferation, neoangiogenesis, and invasion, and endometriotic lesions always remain a benign condition [24]. Therefore, to propose radical surgery to eradicate all the endometriotic lesions is not justified by considering the higher rate of complications than conservative surgery.

It is crucial to preoperatively determine the type of surgery and the need for a multidisciplinary surgical team and to carefully counsel the patient.

During preoperative assessment, the first steps are to analyze the symptoms described by the patient and to perform a meticulous clinical evaluation of the deep endometriotic lesions.

Fauconnier and Chapron described the relationship between a specific type of pelvic pain symptoms and semiology of the painful symptoms: noncyclic pelvic pain and functional bowel signs were found to be associated with bowel involvement [5]. Patients with bowel endometriosis usually complain of constipation, diarrhea, abdominal bloating, tenesmus, lower abdominal pain, and, occasionally, rectal bleeding [3]. During preoperative discussion with the patient, it is essential to evaluate whether the pain is due to the lesions. More importantly, if colorectal endometriosis has been diagnosed in an asymptomatic patient, the surgeon has to consider this information to avoid unjustified surgical procedures with potentially very severe complications.

Finger vaginal examination has relative low sensitivity and specificity to diagnose deep endometriosis. In 2007, Abrao et al. compared clinical examination, transvaginal sonography (TVS), and magnetic resonance imaging for the diagnosis of deep endometriosis [25]. For the diagnosis of rectosigmoid endometriosis, finger vaginal examination had a sensitivity of 72%, a specificity of 54%, a positive predictive value of 63%, a negative predictive value of 64%, and an accuracy of 63%. In 2009, Bazot et al. confirmed the low sensitivity of clinical examination for intestinal endometriosis (46%) [26].

As medical history and clinical examination are insufficient to define the surgical strategy, more investigations are needed to specially evaluate the extent of the disease, the degree of bowel wall infiltration, and the distance to the anal verge.

Indeed, it is important to analyze how deeply the bowel wall is infiltrated by endometriotic lesion before considering either a shaving or a bowel surgery during preoperative patient counseling. The

lesions of the serosa without infiltration of the muscularis are superficial and are not justifying any specific surgical bowel procedure [2].

In a literature review, Meuleman et al., 2011, reported that 95% of the patients undergoing bowel resection anastomosis had bowel serosa involvement; 95% had lesion infiltrating the muscularis, while 38% had lesion infiltrating the submucosa, and 6% had lesions infiltrating the mucosa [15].

By performing a prospective surgical and histological study, Remorgida et al. analyzed bowel specimens removed after disc excision. The histological study revealed that the full-thickness disc excision was incomplete in more than 40% of cases [27]. Our retrospective histological study of 48 colorectal specimens resected just after a rectal shaving revealed the presence of endometriotic lesions in the muscularis layer in 98% of cases and in the submucosal and mucosal layer in 53% and 6%, respectively (Nisolle unpublished personal data).

In 2014, Exacoustos C et al. described a new mapping system by TVS to assess the extent of endometriosis by measuring the size and depth of the lesions at various pelvic locations [28]. They noted a great accuracy (97%) in detecting bladder endometriosis and Douglas obliteration. This pre-operative determination of the extent and location of deep endometriosis should enable the surgeon to plan the surgical approach.

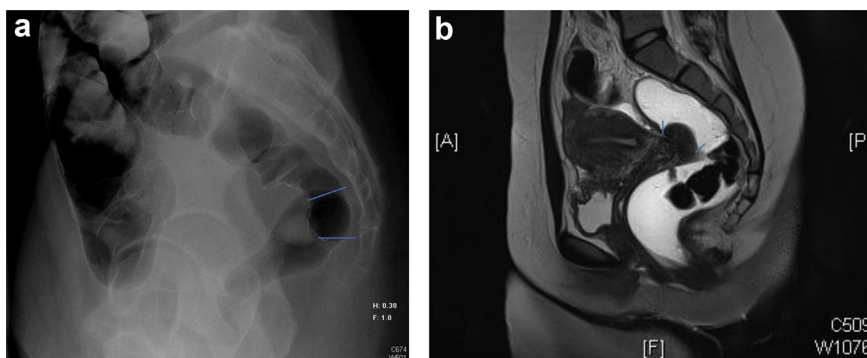
In their study, Exacoustos et al. [28] visualized rectosigmoid nodules as irregular hypoechoic mass penetrating into the intestinal wall, responsible for distortion of the normal structure. Distinction between superficial and full-thickness wall infiltration is feasible by an expert sonograph operator, ideally the surgeon himself. He would therefore have an accurate assessment of the presence and location of deep endometriosis and could plan optimal therapeutic and patient counseling.

Recently, Bazot and Darāi evaluated imaging techniques for the diagnosis of deep endometriosis location [29]. According to the Cochrane review, the pooled sensitivity and specificity in the diagnosis of rectosigmoid endometriosis were noted to be 90% and 96% for TVS and 92% and 96% for MRI, respectively [30].

As negative colonoscopy does not exclude the presence of intramural deep endometriosis, a double-contrast barium enema (DCBE) could be performed to investigate the extent of bowel endometriosis. Deep invasion of the bowel wall is noted as an extrinsic mass compressing the bowel lumen with irregularities and even complete or incomplete bowel stenosis (Fig. 1).

In 2004, Landi et al. performed a retrospective study on 108 women with symptoms suggestive of bowel endometriosis [31]. By performing DCBE before the laparoscopic surgery, the radiographic abnormalities detected in 53 patients (49%) were confirmed in all cases except one.

In a personal series of 135 women with deep endometriosis, a DCBE was carried out in 94 of them. Infiltration of the bowel wall was observed in 50% of them similarly to the observation of Landi et al. In this group of 47 patients, a segmental rectal resection was performed in 37 patients and a rectal shaving in 10 patients. By using an image analysis program (ImageJ; <http://rsb.info.nih.gov/ij/>), we evaluated



**Fig. 1.** a: Double-contrast barium enema. On the profile, an extrinsic mass compressing the bowel lumen is observed. Arrows are delimitating the endometriotic bowel lesion. b: In MRI, the corresponding endometriotic bowel lesion is delimited by arrows.



the surface of the bowel endometriotic lesion and the degree of bowel stenosis. The median surface was 114.57 mm<sup>2</sup> in the shaving group and 302 mm<sup>2</sup> in the segmental colorectal resection and the median stenosis was 26% in the shaving group and 43% in the segmental colorectal resection. These personal data confirmed that the shaving is possible even in the case of deep bowel endometriosis, but because of the incomplete removal of the endometriotic lesion, recurrence had been observed and reoperation was needed in 2 of the 10 women.

Recently, Jiang J et al. compared rectal water contrast transvaginal ultrasound (RWC-TVS) with DCBE in the diagnosis of endometriosis. DCBE and RWC-TVS demonstrated similar accuracies in the diagnosis of bowel endometriosis [32].

Indeed, sensitivities of 96.4% and 82% and specificities of 100% and 97.3% were noted by DCBE and RWC-TVS, respectively.

Ideally, the distance from the inferior border of the lowest bowel lesions to the anal verge should also be evaluated preoperatively. Indeed, the surgical treatment of low rectal lesion defined as 5–8 cm from the anal verge is associated with a high risk of postoperative anastomotic leaks and a transient neurogenic bladder dysfunction [33,34]. In such circumstances, a prophylactic temporary stoma (ileostomy or colostomy) is proposed to the patient, especially if the endometriotic lesion also infiltrates the posterior vaginal fornix requiring vaginal opening [35].

Removal of colorectal endometriosis is indicated in symptomatic patients, as improvement of pelvic pain and digestive symptoms has been described, as well as benefits on quality of life [19,23]. When surgical removal of colorectal endometriosis is indicated, care has to be taken to discuss on the possible complications with the patient preoperatively, as all types of surgical procedures are associated with a high risk of complications. Indeed, in a series of 364 women undergoing surgery for bowel endometriosis, the rate of Clavien 3b postoperative complications was 11.8% [16,36]. The rate of these complications was as follows: 5.5% in the shaving group (n = 8/145), 7.5% in the disc excision group (n = 6/80), and 20.9% in the segmental colorectal resection group (n = 29/139). According to this observation, the authors recommended to propose the shaving procedure whenever possible.

Moreover, the long-term functional outcomes following rectal shaving have been described to be better in terms of gastrointestinal quality of life, rate of constipation, and anal continence [23]. The size of the nodule has also to be considered. Indeed, if the nodule is more than 20 mm in length, there is no postoperative difference between the 3 techniques in terms of rectal function [37]. However, the risk of postoperative stenosis at the anastomotic level is higher in cases of segmental colorectal resection than in cases of shaving and disc excision, requiring secondary endoscopic dilatation and even reoperation.

If shaving is proposed to patients with deep bowel endometriosis, the removal of the lesion would be incomplete but associated with improvement of pelvic pain and, more importantly, with decreased rate of complication. The rate of recurrence of pelvic pain is higher than that in cases of complete lesion removal [38], but the delay between the surgery and the symptoms is unknown. Nevertheless, a more radical surgical procedure could be proposed in case of recurrence of severe pelvic pain associated with endometriosis.

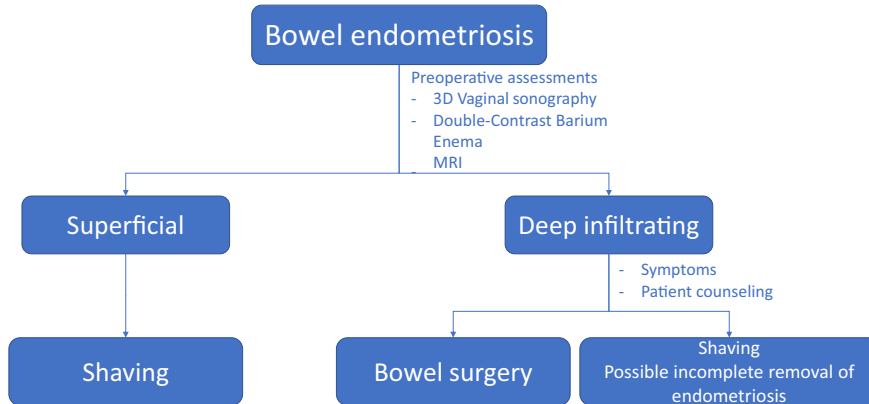
Recently, Donnez and Roman suggested the following algorithm for surgical management of deep endometriosis [39]. In case of asymptomatic patients, a follow-up has to be proposed, and in case of appearance of lesion growth symptoms, a medical therapy should be proposed.

In case of a symptomatic nodule of more than 2–3 cm, they propose surgery, and the first line of treatment should be shaving followed by disc excision if shaving is inadequate.

They propose, as absolute indication of surgery, ureteral involvement association with bladder endometriosis and bowel involvement with a stenosis of more than 50% and association with endometrioma of more than 3–4 cm in diameter.

Concerning the abstention of surgery in asymptomatic patients, we must be careful, as some patients could have serious bowel or bladder involvement without any symptoms. In such asymptomatic patients, a follow-up should be proposed. The question remains on the role of surgery in asymptomatic patients with ureteral involvement, as several cases of renal atrophy had been published in the literature [40].

Kho et al., in their recent review, proposed the following clinical algorithm in symptomatic women with deep endometriosis (visual analog score >7): disc excision or rectal shaving is proposed in cases of



**Fig. 2.** Proposed algorithm for the management of symptomatic patients with bowel endometriosis. A precise preoperative assessment (3D vaginal sonography, double-contrast barium enema, and MRI) is crucial to determine the degree of bowel infiltration. If the lesion is superficial involving the serosa or the superficial layer of the rectal wall muscularis, a shaving should be proposed. On the other hand, in case of deep infiltrating endometriosis involving the muscularis layer very deeply or even the submucosal or the mucosa, the decision of performing bowel surgery versus shaving has to be made depending on the symptoms of the patient and patient counseling.

a nodule  $\leq 3$  cm diameter, unique or infiltrating the outer muscularis and segmental bowel resection if the nodule is  $> 3$  cm, multiple and infiltrating the outer muscularis [41].

According to previous discussion, the algorithm of surgical management of bowel endometriosis could be summarized as follows (Fig. 2):

A precise preoperative assessment (using 3D vaginal sonography and double-contrast barium enema, MRI) is crucial to determine if the bowel endometriosis is superficial or deep infiltrating. If the lesion is superficial involving the serosa or the superficial layer of the rectal wall muscularis, shaving should be proposed. On the other hand, in case of deep infiltrating endometriosis involving the muscularis layer very deeply or even the submucosa or the mucosa, the decision of performing bowel surgery versus shaving has to be made depending on the symptoms of the patient and patient counseling. Indeed, if the patient has severe typical bowel symptoms, a radical bowel surgery could be proposed, but on the contrary, if the symptoms are minimal, a shaving could be carried out even if the removal of the endometriotic lesion is incomplete.

Counseling of the patient is very important, and before performing bowel surgery for deep infiltrating endometriosis, we have to consider the benefits and the risks of such an aggressive surgery.

## Summary

The surgical management of bowel endometriosis is a real challenge. In addition to that, only symptomatic patients should undergo surgery, no consensus has been reached in the literature.

Among the surgical techniques, 3 surgical procedures have been described: rectal shaving, disc excision, and segmental colorectal resection. All these procedures are associated with complications, but the risk of rectovaginal fistula is higher if disc excision or segmental colorectal resection is performed. Presurgical evaluation of bowel infiltration using various imaging techniques is therefore of utmost importance to define surgical strategy for the patient. During patient counseling, the surgeon has to explain that all types of procedures are associated with complications. Moreover, patients must be aware that rectal shaving can lead to incomplete removal of the lesion, but this remains an option as endometriosis, even deeply infiltrating the bowel, is a benign condition.

Whatever the planned surgical procedure (conservative or radical), the surgeon has to follow the recommendations to minimize surgical complications, especially in cases of radical surgery.



**Practice points**

- Deep colorectal endometriosis is challenging, as the rate of complications is high in conservative and radical surgery.
- Preoperative mapping is essential to define the type of surgery, need for a multidisciplinary approach, and patient counseling.
- In cases of conservative and radical surgery, care has to be taken to minimize associated complications by following some surgical rules.

**Research agenda**

- The data concerning the spontaneous evolution of the disease in cases of incomplete removal are missing.
- Objective evaluation of the bowel infiltration should be developed to define a cutoff for bowel endometriosis surface and stenosis and to facilitate the decision between conservative and radical surgery.

**Conflicts of interest**

The authors have no conflicts of interest.

**Acknowledgments**

This work is not supported by any grant.

The authors acknowledge the medical and paramedical teams for clinical management of all patients in the department suffering from chronic pelvic pain, especially from endometriosis.

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