Laparoscopic Treatment of Deep Infiltrating Endometriosis Affecting the Rectosigmoid Colon: Nodulectomy or Segmental Resection?

William Kondo1,2*, Reitan Ribeiro2, Carlos Trippia1 and Monica Tessmann Zomer1,2

1Department of Gynaecology, Sugisawa Medical Center, Curitiba, Parana, Brazil
2Department of Gynaecology, Vila Batel Hospital, Curitiba, Parana, Brazil

Abstract

Intestinal Deep Infiltrating Endometriosis (DIE) is defined as the lesion infiltrating at least the muscular layer of the bowel and it usually affects the rectosigmoid colon. Medical treatment plays an important role in terms of pain relief in women with such lesions, but has a temporary effect. Surgical treatment is considered the gold standard for symptomatic patients and may be conducted by the means of conservative or radical procedures. The former may be called "nodulectomy" and include the rectal shaving, the mucosal skinning and the full-thickness anterior rectal wall excision/disc resection. The latter is called segmental bowel resection. Each type of procedure has different indications, outcomes, and complications. In this paper, we provide the rationale for the surgical treatment of intestinal DIE affecting the rectosigmoid colon.

Keywords: Deep infiltrating endometriosis; Laparoscopy; Surgery; Colorectal; Bowel

Introduction

Endometriosis is a complex gynecological disease defined by the presence of endometrial glands and stroma outside the uterine cavity [1]. It mainly affects reproductive aged women and its prevalence in the general female population is estimated to be around 10% [2,3]. Three clinical presentations of the disease have been described and they may occur alone or coexist: peritoneal endometriosis, ovarian endometrioma, and Deep Infiltrating Endometriosis (DIE) [4]. The latter is considered the most aggressive presentation of endometriosis, penetrating more than 5 mm in affected tissues [5], and affecting approximately 20% of all women with the disease [6,7]. The hallmark of DIE is the multifocal pattern of the lesions [8-11].

Intestinal DIE is defined as the lesion infiltrating at least the muscular layer of the bowel [11] and it usually affects the rectosigmoid colon. Its prevalence is estimated to be 45 to 56% in women with DIE [8,9] and 57.1% in women with ovarian endometrioma [12]. Medical treatment plays an important role in terms of pain relief in women with DIE, but has a temporary effect [13]. The associated fibrosis and sclerosis do not improve after hormonal treatment [14] and it is not clear if it prevents disease progression, especially in more severe cases [15]. Due to persistent or recurrent pain, and the marked anatomic distortion caused by intestinal DIE, surgery is considered the gold standard for symptomatic disease. Surgery is also indicated for intestinal DIE lesions leading to luminal stenosis and obstructive symptoms. In addition, the clinical treatment has no benefit on endometriosis-related infertility [1].

There are two options of surgical management of intestinal DIE affecting the rectosigmoid. The conservative forms of surgery may be called "nodulectomy" and include the rectal shaving, the mucosal skinning and the full-thickness anterior rectal wall excision/disc resection. The radical surgery is called segmental bowel resection [16]. Each type of procedure has different indications, outcomes, and complications. The purpose of this paper is to provide the rationale for the surgical treatment of intestinal DIE affecting the rectosigmoid colon.

Anatomical Distribution of the Intestinal Die Lesions

The rectosigmoid colon is the most frequently affected site by intestinal DIE [8,15,17]. There are 2 important basic characteristics of intestinal DIE: multifocality and multicentricity. The former is defined as the presence of other lesions within a 2 cm area to the main DIE lesion and the latter is defined as the presence of other lesions beyond 2 cm from the main DIE lesion. They seem to occur in 62% and 38% of surgical specimens, respectively [18].

In the series of Piketty et al. [9], the mean number of intestinal DIE implants per patient was 2.7 ± 1.5. The anatomical distribution of the lesions along the bowel was:

- Rectum: 96%
- Sigmoid: 38.7%
- Ileum: 22.7%
- Cecum: 10.7%
- Appendix: 10.7%
- Omentum: 4%

Preoperative Imaging Studies

Several imaging studies have been used to preoperatively evaluate the DIE lesions, including transvaginal ultrasound, magnetic resonance imaging of the pelvis, and transrectal ultrasound [9,19-24]. No matter which exam is performed, the aim of the preoperative study is to completely map all the deep implants of the disease, mainly those affecting the digestive and/or urinary tract [25].

*Corresponding author: Dr. William Kondo, Department of Gynaecology, Sugisawa Medical Center, Curitiba, Parana, Avenida Getulio Vargas, 3163 ap 21, Curitiba, PR, Brazil. Zip Code: 80240-041, Tel: (55) (41) 9222-1065; E-mail: williamkondo@yahoo.com

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Specifically for the intestinal DIE lesions, the preoperative imaging investigation should contain the following informations [19-21]:

- Size of the lesion;
- Depth of bowel wall infiltration;
- Distance between the intestinal DIE lesion and the anal verge;
- Percentage of the intestinal circumference affected by the lesion;
- Presence of multifocal/multicentric intestinal DIE lesions.

### Laparoscopic Surgical Techniques

The laparoscopic surgical procedures to treat rectosigmoid DIE lesions can be divided into two concepts of surgery: conservative and radical. Conservative surgery may also be called “nodulectomy” and means the resection of the intestinal DIE implant. It can be achieved using the following techniques:

- Rectal shaving [16,26-28]
  - Traditional technique
  - Reverse technique
  - Mucosal skinning [29]
- Full-thickness anterior rectal wall excision/disc resection [16,30]
  - Scissors and suture
  - Circular stapler
  - Linear stapler

All techniques have the aim of removing the rectosigmoid DIE nodule along with less (shaving) or more (disc resection) layers of the anterior rectal wall. The technical aspects of all procedures have already been described elsewhere in the literature [16,26,27,30]. Radical surgery may also be called segmental bowel resection and is defined by the resection of a bowel segment affected by the endometriosis followed by primary colorectal anastomosis [16,30,31]. A protective ileostomy may be performed depending on the distance between the intestinal DIE lesion and the anal verge [31,32].

### How to Choose between Nodulectomy and Segmental Resection?

#### Indications

**For nodulectomy:** Shaving may be performed more or less aggressively in the bowel wall. Classical shaving should be indicated for DIE lesions affecting the rectum up to the muscular layer. The aim of the procedure is to find a plane within the muscular layer of the rectum where there is no more evidence of endometriotic glands. The deeper the lesion the higher the risk of bowel opening during the procedure. When the lesion affects the submucosal layer, shaving with mucosal skinning is an option [29]. At this technique, only the mucosa is preserved intact and the defect in the bowel wall is closed with suture. As mucosal preservation is not easily achieved, frequently the anterior rectal wall is completely opened during the procedure. Full-thickness anterior rectal wall excision using scissors and suture is another option for rectosigmoid DIE lesions, especially for those infiltrating deeper than the muscular layer of the bowel. Alternatively, full-thickness anterior rectal wall excision (disc resection) may be performed using circular stapler. It is usually indicated for a single intestinal DIE lesion located at the anterior rectosigmoid wall, smaller than 30 mm in diameter, and affecting less than one-third of the intestinal circumference [16,30,33]. Nevertheless, some authors [30] have been using a double-stapling anterior disc resection technique with the intent to resect bigger lesions (up to 60 mm in diameter) with good results.

**For segmental bowel resection:** Most of the authors indicate segmental bowel resection for rectosigmoid DIE lesions bigger than 30 mm, stenotic lesions (that does not allow the passage of the circular stapler), sigmoid lesions (that can not be reached by the circular stapler), and multifocal/multicentric lesions.

#### Rationale

**For segmental bowel resection:** The best arguments in favor of the segmental bowel resection are:

- Multifocal pattern of distribution of the intestinal DIE lesions [8-11,18];
- Ensure completeness of resection;
- Safe procedure in experienced centers [31,34,35].

Taken into account that intestinal DIE is frequently multicentric/multifocal [8-11,18], many authors claim that the lesion should always/most of the times be treated by means of a segmental bowel resection. Indeed, when Remorgida et al. [36] evaluated bowel specimens from 16 women receiving a full-thickness disc resection followed by a segmental bowel resection (during the same surgical procedure), residual intestinal DIE lesion was still present in 43.8% of the cases.

**For nodulectomy:** However, there are important considerations to be taken into account in favor of nodulectomy:

- Nodulectomy performed in those cases in which the surgeon know that the segmental bowel resection will be carried on in the same procedure will probably not be the same as nodulectomy performed in other situations;
- Margins of resection are not always free from disease after segmental bowel resection. There is histologic evidence of positive margins after segmental bowel resection in up to 22% of the cases [15,37];
- It is not known if the radicality of the resection has a direct correlation with clinical improvement of the patient symptoms. Recently, Mabrouk et al. [38] showed that the presence of satellite lesions or positive resection margins does not seem to influence clinical outcomes of segmental bowel resection;
- There are some surgical specimens after segmental bowel resection with no evidence of intestinal DIE. In the review conducted by Meuleman et al. [15], in 0.8% of the patients the bowel segment had no histologic evidence of transmural invasion by the disease;
- Some studies suggest that functional adverse effects (bowel and/or bladder dysfunction) after segmental bowel resection are greater than after nodulectomy [39-42];
- The risk of postoperative intestinal fistula after segmental bowel resection is greater than after nodulectomy [41,43-46].

#### Discussion

The most appropriate surgical approach for rectosigmoid DIE still remains controversial [15]. The choice between conservative and radical treatment depends on the characteristics of the lesion on preoperative imaging work-up, surgeon’s experience and school of thought [41]. More than 70% of women presenting with intestinal DIE still experience segmental bowel resection [15,47]. The argument
supporting this approach is the belief in a reduced risk of recurrence after radical removal of occult endometriotic foci [31,41]. Alternatively, nodulectomy rather than segmental bowel resection may be performed for some types of intestinal DIE lesions with good results. Conservative surgery has been demonstrating lower morbidity and better digestive and urinary functional outcomes than radical surgery [40,41,45,46,48]. In addition, microscopic endometriotic lesions may still be found on the margins of segmental bowel resection [15,37,49] and rectosigmoid resection does not avoid postoperative recurrences of pain [49], especially in those women with the presence of uterine adenomyosis [50]. Also, the clinical implications of leaving residual disease (satellite lesions, positive resection margins or microscopic foci of endometriosis) in the digestive tract is unknown [38,45]. Mabrouk et al. [38] evaluated the histopathological patterns of colorectal endometriosis and investigated relationships between histological findings and clinical data observing that the persistence of residual disease did not influence clinical outcomes of segmental bowel resection.

Complications

Both the conservative and the radical treatment of intestinal DIE may have the potential risk of complications. The two major complications of the surgical treatment of intestinal DIE are anastomotic leakage and rectovaginal fistula [15,26,31,41,44,46,51]. Anastomotic dehiscence and leakage seem to occur after segmental bowel resection in 3% to 7% of cases and up to 20% in low rectal anastomosis [52,53]. An independent predictor for postoperative anastomotic leaks after segmental bowel resection is the colorectal anastomosis less than 10 cm from the anal verge [32,54-56]. That is why temporary diverting ileostomy seems to be advisable in such cases [32,56]. In one systematic review including 2036 women undergoing segmental bowel resection for intestinal DIE, the rates of rectovaginal fistula and anastomotic leakage were 2.7% and 1.5%, respectively [15]. In the large series of Russo et al. [31], laparoscopic rectal resection for severe endometriosis of the mid and low rectum was conducted in 750 women and the rates of anastomotic leak and rectovaginal fistula were 3% and 2%, respectively. On the other hand, the rate of intestinal complications after shaving and disc excision is reported to be up to 1.6% [28,44] and 3% [17,46], respectively.

Urologic complications (ureteral fistula or stenosis) may also be seen after colorectal resection for DIE due to the complex and extended dissection of deep pelvic spaces required in such procedures [41,44,57]. Ureteral fistula seems to occur in up to 3% of women undergoing surgery for intestinal DIE [44,57,58] due to ureteral damage from the heat transferred to the ureteral wall by the use of bipolar or monopolar energy during the dissection [59]. In addition, postoperative urinary and/or intestinal dysfunctions are supposed to occur after surgery for intestinal DIE. Segmental bowel resection requires more enlarged and deeper dissection of paraaortal spaces than nodulectomy leading, in theory, to more frequent nerve injuries [41]. De novo digestive symptoms can develop, particularly after rectal ampulla resection, including constipation, difficult defecation, a sense of incomplete emptying, or diarrhea [60,61]. Transient neurogenic bladder leading to urinary retention, dysuria or, in severe cases, permanent areflexic bladder have also been reported, but the latter is a rare complication [43]. It may concern up to 16% of patients managed for rectal endometriosis [62] and is generally the result of injury of the hypogastric plexus that contains the pelvic parasympathetic fibers responsible for the voiding function of the bladder detrusor [63-65]. Nerve-sparing surgery has been advocated to decrease the incidence of such functional urinary side effects [66-68]. Nodulectomy seems to have similar or better results in terms of functional digestive and urinary outcomes compared with segmental bowel resection [40,41,43,45].

Quality of Life and Recurrence

The improvement of pelvic pain after conservative and radical approaches for intestinal DIE are comparable [40,41,43,45]. In the review of Meuleman et al. [15], total recurrence rate seemed to be lower in the segmental bowel resection group than after conservative treatment (5.8% vs. 17.6%). Conversely, recently findings from Fanfani et al. [45] did not show any significant difference in the recurrence rate between women managed by either segmental bowel resection or nodulectomy in a median follow-up of 33 months. Also, the experienced group headed by Donnez and Squifflet reported a recurrence rate of 8% in a series of 500 women undergoing conservative treatment (shaving) [28].

Final Considerations

There is a global trend towards minimally invasive approaches in the management of patients with intestinal DIE. Both nodulectomy and segmental bowel resection may be options to treat the disease and there is a rationale supporting each technique. Regardless of which technique is employed, one should keep in mind that endometriosis is a benign disease and that the main objective of the treatment is to improve the patient’s quality of life. The rationales for both conservative and radical surgeries were discussed in our paper. Prospective studies are still necessary to define which technique is the gold standard to manage intestinal DIE.

References


