

The feasibility of laparoscopic bowel resection performed by a gynaecologist to treat endometriosis

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Purpose of review

Intestinal endometriosis is commonly diagnosed in the setting of deeply infiltrating endometriosis. A multidisciplinary team that includes gynaecologists and general surgeons traditionally performs laparoscopic bowel resections for symptomatic patients. Recently, Pereira *et al.* has published the results of a series of patients who underwent laparoscopic bowel resection for endometriosis performed by a team of gynaecologic surgeons, after a period of experimental training with animals and joining participation with general surgeons in the first cases. It is suggested that gynaecologic surgeons may be able to perform laparoscopic bowel resections for endometriosis, if properly trained, although the results may not be reproducible.

Recent findings

A review of recent literature related to laparoscopic bowel resections for endometriosis showed that the learning curve and experience of the surgeon may be the most important predictive factors for the effectiveness of the procedure. Results concerning major operative complications and clinical remission were considered satisfactory in both single and multidisciplinary approaches, that is, laparoscopic bowel resections performed by gynaecologic and colorectal surgeons. Protective colostomies or ileostomies could not reduce the rate of rectovaginal fistulae in multidisciplinary experiences.

Summary

The single-surgeon model approach in laparoscopic excision of endometriosis that includes bowel resection may provide advantages for both the patients and healthcare system. The best model should be decided on the maximum benefit of the patient.

Keywords

bowel endometriosis, colorectal surgeon, endometriosis, gynaecologist surgeon, laparoscopic bowel resection

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The surgeon has a wonderful opportunity to study ‘living pathology’ in both the early and the advanced stages of the disease, which unfortunately the pathologist, working in the laboratory, rarely sees [The surgeon] has a responsibility and likewise an opportunity both to try to relieve the patient and also to increase his knowledge of the subject. His first duty is to the patient, but the attempt to increase his knowledge of ‘living pathology’ need not necessarily interfere with the welfare of individual patients, and the sum total of his observations may be of great value both to the patient under observation and also to others (Sampson, 1924)

and surgery is the only effective treatment for symptomatic patients [1^{••},2]. Symptoms of bowel endometriosis are classically cyclical, but they also may be present in a less intense manner during both the premenstrual and periovulatory periods. Some common symptoms may include pain on defecation, bloating, and bowel cramping that is relieved by passing flatus or defecation. Those may be more common during menses, but they also may be present all month long [3]. More frequent bowel movements during menses may be also observed, but they do not constitute diarrhea. Cyclic rectal bleeding during menses is rarely observed [4[•]]. Because of these symptoms, many women are misdiagnosed with irritable bowel syndrome, and may be mistakenly treated as such [5,6].

Treatment of intestinal endometriosis was initially based on reports by general surgeons treating symptomatic intestinal disease by laparotomy, during emergency

Introduction

Intestinal endometriosis represents one of the most common forms of deeply infiltrating endometriosis (DIE),

surgery for bowel obstruction, or for perforation of the ileum or rectosigmoid colon [7–9]. The incidental finding of bowel endometriosis was also common during surgical exploration for bowel tumors [10]. Gynaecologic surgeons were the first to treat intestinal endometriosis by laparoscopy as an elective procedure [11,12]. Despite increasing reported experience with the technique, it was not until recently that the subject of whether or not the gynaecologist surgeon should perform laparoscopic bowel resection (LscBR) for endometriosis was openly discussed, based on a long-term experience and follow-up of a group of patients operated by a team of gynaecologic surgeons [13^{**}]. Current recommendations are that a multidisciplinary team including general surgeons should treat bowel endometriosis in tertiary centres [1^{**},14,15]. In this review, we highlight the very singular aspects of bowel endometriosis, the surgical context where the disease is found, and the rationale for primary surgical treatment of intestinal endometriosis by gynaecologists.

There are different surgical techniques for different types of bowel endometriosis

Superficial lesions of endometriosis confined to the serosa of the bowel are usually clinically insignificant and can be treated like peritoneal disease [16]. Clinically significant bowel endometriosis is manifest when the disease infiltrates the muscularis of the bowel wall (Figs. 1 and 2). At surgery, nodules or thickening may be quite apparent, and therefore diagnosis is often by visualization. In referral centres, approximately 25% of women with endometriosis have intestinal involvement. Intestinal lesions are not always isolated to one area of the bowel [13^{**},17]. Lesions are distributed in the rectum, sigmoid colon, vermiform appendix, terminal ileum, cecum and des-

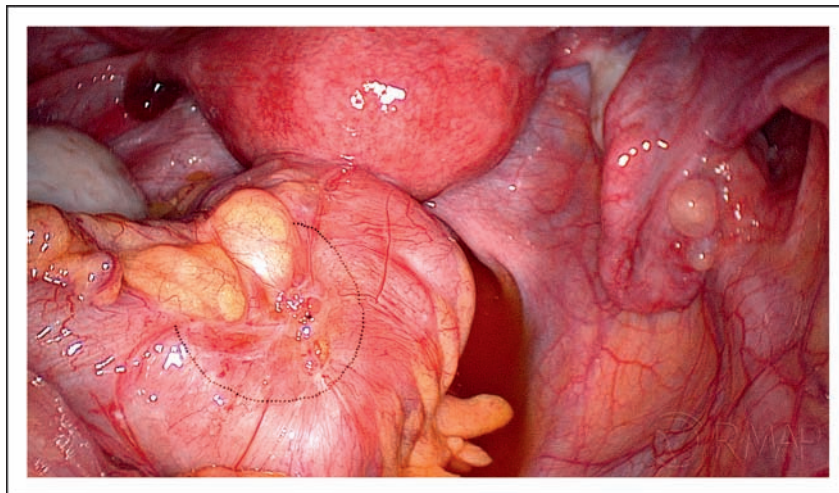
cending colon, in order of frequency [13^{**}]. Therefore, LscBR for endometriosis requires surgery in various segments of the bowel, most commonly in the rectosigmoid. A summary of LscBR techniques and variations for endometriosis treatment is given in Table 1, and they have been summarized elsewhere [13^{**},18–23].

Surgical excision of bowel endometriosis is a ‘see and treat’ procedure. Bowel nodules and thickening must be identified during surgeries and readily treated, as proposed by Redwine and Sharpe [3]. Histopathology reports should only confirm the visual diagnosis of the disease, and they should not guide treatment. A pre-operative diagnosis of rectosigmoid endometriosis made by history and pelvic examination may be highly accurate in the hands of specialists, although the final decision about which type of bowel resection is required is made only during surgery. The examiner’s fingers cannot reach the appendix, ileum and cecum so endometriosis in these locations is most commonly found only during surgery.

The surgeon should be prepared to perform different LscBR techniques according to the intraoperative findings. The vermiform appendix should be removed in the presence of hyperaemia, congestion, extensive adhesions, fibrous nodules or typical endometriotic lesions. Terminal ileum disease should be treated in the presence of local stenosis or symptoms such as cyclical and persistent periumbilical, right lower quadrant or epigastric pain [24] or recurrent small-bowel obstruction [25].

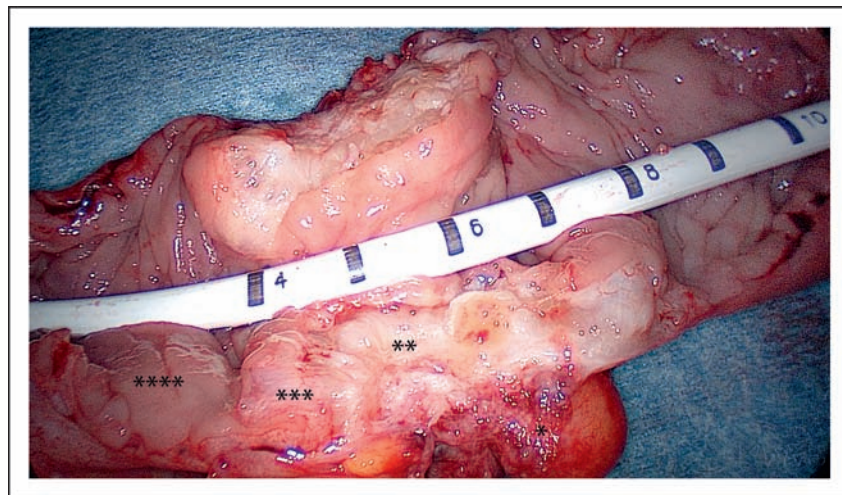
Rectosigmoid resections should be performed for the symptoms previously described and also in the setting of infertility. Improvement of fertility has been

Figure 1 Laparoscopic view of sigmoid colon endometriosis



Endometriotic nodule that infiltrates the bowel wall and causes local anatomical distortion. Dotted line indicates the complete extension of the nodule.

Figure 2 Surgical specimen of Fig. 1



The endometriotic nodule infiltrates the serosa, muscular and submucosal layers of the bowel wall, causing segmental stenosis. Individual layers are depicted in the figure as (*) serosa, (**) muscular, (***) submucosa, and (****) mucosa.

demonstrated after radical excision of DIE that includes LscBR [2,20,26,27*].

The rectosigmoid has four intraperitoneal layers that are serosa, outer longitudinal muscularis, inner circular muscularis, and mucosa. Beneath the cul-de-sac reflection the serosa is lost. The muscle layers can be individually peeled apart like the layers of an onion, which leads to several possibilities of intestinal resection depending on the degree of invasion.

- (1) Laparoscopic rectosigmoid shaving resection (LscShR) is the removal of the lesion only from the rectosigmoid wall (not its full thickness), usually followed by primary suture of the defect. It is best reserved for those lesions smaller than 1 cm.
- (2) Laparoscopic ‘mucosal skinning’ (LscMS) is removal of both layers of intestinal muscularis down to the undisturbed mucosa. This can be used for lesions that are not spherical or large and is especially useful for removing plaques of endometriosis which are located along the anterior rectosigmoid. The muscularis can be repaired with interrupted permanent or dissolving sutures.
- (3) Laparoscopic rectosigmoid discoid resections (LscDR) are full thickness ‘disk’ resections of the anterior bowel wall (Fig. 3). They are indicated for single bowel lesions smaller than 3 cm that do not compromise more than a third of the total circumference of the segment. Repair of a full-thickness discoid resection may be by a two-layer suture technique or by using the laparoscopically assisted transanal discoid resection (LscTADR) with a circular

stapler [15,18,22,28], a technique that provides low risk of stenosis, leaking or dehiscence [15,18].

- (4) Laparoscopic rectosigmoid segmental resections (LscSgR) are best suited for multiple or bigger endometriotic lesions that cause evident bowel distortion (Fig. 4). Such a lesion in the sigmoid colon will typically require LscSgR [13**,19,20,29]. Mechanical staplers are of great help for bowel section and end-to-end anastomosis. Bowel resection for endometriosis is less extensive than that performed for colon cancer, because with endometriosis the bowel mesentery can be left undisturbed, and the resection can be limited to the margins of the visible lesions. The concept of ‘invisible’ microscopic endometriosis that would justify larger resections is unproven and seems to be anecdotal [30]. The use of a nerve-sparing technique should be attempted in all cases [31]. The maximum sparing of mesenteric nerves occurs when the mesentery is separated immediately adjacent to the bowel wall.

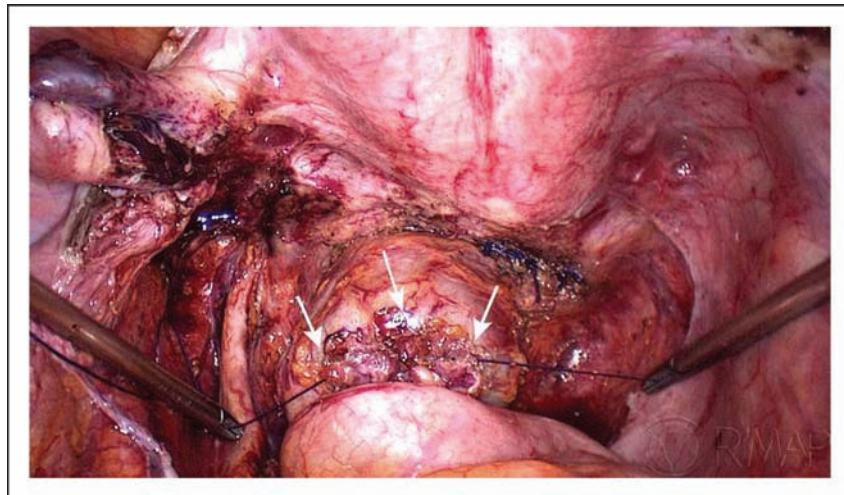
Laparoscopic excision of DIE with bowel resection is a highly complex procedure, and the gynaecologist surgeon should be prepared for it.

As stated by Thomas Cullen, the “removal of extensive adenomyoma of the rectovaginal septum is infinitely more difficult than a (Wertheim) hysterectomy for carcinoma of the cervix” [32]. Laparoscopic radical excision of DIE is a very complex procedure, and the gynaecologist surgeon is the medical professional who should be prepared for it. Although considered a gynaecological disease, endometriosis is often a female-pelvic disease,

Table 1 Description of possible laparoscopic procedures performed for resection of bowel endometriosis

Laparoscopic rectosigmoid segmental resection (LscSgR)	Laparoscopic rectosigmoid discoid resection (LscDR)	Laparoscopic rectosigmoid shaving resection (LscShR)	Laparoscopic cecal resection (LscCR)	Laparoscopic terminal ileal resection (LscIR)	Laparoscopic appendectomy (LscAp)	Laparoscopic mucosal skinning
Laparoscopic segmental resection with placement of the anvil through minilaparotomy	Laparoscopic discoid resection with laparoscopic suturing	Laparoscopic deep shaving resection with laparoscopic suturing	Laparoscopically assisted minilaparotomic partial cecal resection	Laparoscopically assisted minilaparotomic segmental resection	Laparoscopically assisted transumbilical appendectomy	Laparoscopic mucosal skinning for appropriate lesions of rectosigmoid
Laparoscopic segmental resection with placement of the anvil through vagina	Laparoscopic discoid resection with transvaginal suturing	Laparoscopic deep shaving resection with transvaginal suturing	Laparoscopically assisted minilaparotomic ileo-cecectomy	Laparoscopically assisted minilaparotomic discoid resection	Laparoscopically assisted transvaginal appendectomy	Laparoscopic mucosal skinning for appropriate lesions of ileum
Laparoscopically assisted minilaparotomic segmental resection with sectioning of both stumps through minilaparotomy	Laparoscopically assisted transanal discoid resection with the circular stapler	Laparoscopic superficial shaving resection with laparoscopic suturing		Laparoscopically assisted minilaparotomic shaving resection	Laparoscopic appendectomy	Laparoscopic mucosal skinning for appropriate lesions of cecum
Laparoscopically assisted minilaparotomic segmental resection with sectioning of the proximal stump through minilaparotomy	Laparoscopically assisted transanal double discoid resection with two circular staplers					
Laparoscopically assisted transvaginal segmental resection with sectioning of both stumps through vagina	Laparoscopically assisted transvaginal discoid resection					
Laparoscopically assisted transvaginal segmental resection with sectioning of the proximal stump through vagina						

Figure 3 Laparoscopic rectosigmoid discoid resections (LscDR)



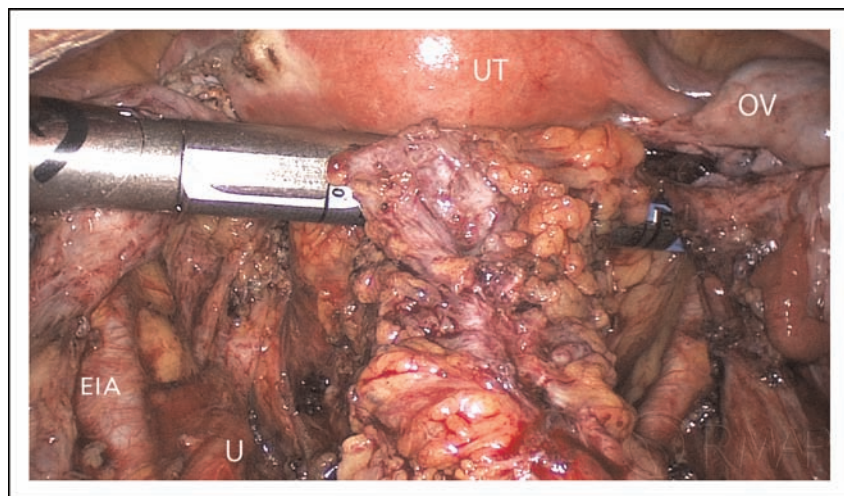
The endometriotic nodule is isolated and transfixed with a poliglactin suture (white arrows). Countdownward movement is applied to imbricate the nodule inside the transanally passed laparoscopic circular stapler, which is already open inside the bowel. Closing and 'firing' of the stapler will section a 'half moon' anterior part of the bowel wall.

since it is not restricted to the gynaecological organs. With this concept in mind, didactical divisions establishing which pelvic organs should be treated by which specialty become artificial and useless. Surgery is surgery no matter what organ is being operated on, and the basic principles of anatomic dissection, hemostasis, and suturing are the same for all surgeries. Treatment of severe pelvic and intestinal endometriosis would theoretically best be done by an 'über' surgeon. This would be a surgeon who not only understands the pathology and distribution of the disease, but who is also able to deal

with every difficulty and challenge of such a surgery because such a surgeon performs all aspects of the surgery frequently. This would mean that each patient would automatically have the most experienced surgeon available, rather than be subjected to the variable experience of an ad-hoc surgical team, which may be assembled hastily and with some difficulty.

Bowel endometriosis is commonly associated with severe DIE elsewhere in multiple other pelvic locations, such as the uterosacral ligaments, lateral parametria, pelvic

Figure 4 Laparoscopic rectosigmoid segmental resection (LscSgR)



A laparoscopic mechanical stapler sections the distal limit of the bowel segment to be resected, after dissection and preservation of the mesentery off the bowel wall. The stapler anvil will be placed in the proximal segment of bowel, either transvaginally or through an abdominal 3-cm wall. EIA, left external iliac artery; OV, right ovary; U, left ureter; UT, uterus.

sidewall (including major pelvic vessels, pelvic nerves and ureter), ovaries, bladder, vagina, etc. [16]. Bowel resection for endometriosis is only a part of the greater challenge that is to surgically eradicate all peritoneal, retroperitoneal and visceral lesions, while preserving pelvic organs function and fertility. As pelvic retroperitoneal anatomy is complex and can vary with distortion by invasive disease, the surgeon performing laparoscopic excision of DIE must be a master of normal and deranged anatomy. Concerning the anatomy of the bowel, the surgeon should be able to understand the localization of its main vessels and anastomotic network. He or she should also be able to understand the autonomic innervation of the rectosigmoid colon, to identify and preserve the inferior hypogastric nerves, the inferior hypogastric plexus, the medial efferent bundle responsible for bowel autonomic (emptying) function, which is directed towards the lower rectum, and the anterior efferent bundle responsible for bladder autonomic (emptying) function [31]. There must be a specific training in laparoscopic suturing, both for intracorporeal and extracorporeal knots, as well as training in bowel mechanical closure using linear staplers for cutting and circular staplers for end-to-end anastomosis or anterior disc resection. The surgeon should understand the physiology of sexual, urinary and evacuatory functions and be able to reduce the risk of postoperative organ dysfunction. The surgeon should also be able to identify the main signs and symptoms of postoperative complications related to bowel resection, including peritonitis, abscess formation, bacterial translocation, anastomosis dehiscence and intestinal fistulae. In the presence of a surgical complication, surgical intervention is frequently necessary and must be done promptly and without delay.

Why should the gynaecologist perform bowel resection for endometriosis: the single-surgeon model

Primary care of women's health is the gynaecologist's assignment. For many women the gynaecologist will be the first and only doctor to be seen for many medical concerns. The gynaecologist has a wonderful opportunity to hear and to examine the patient, to correlate clinical findings, and to evaluate endometriosis in both the initial and advanced stages of the disease. Unfortunately, general surgeons who are called upon only to perform LscBR will rarely have the same overview of the disease. The gynaecologist surgeons could therefore be trained on specific techniques for LscBR in the setting of DIE. The gynaecologist professional has also the opportunity to make an early diagnosis of endometriosis, although this is not always the case. There is usually a long delay of time between the onset of first symptoms of the disease to its final diagnosis. Arruda *et al.* [33] found a median time of 7 (range 3.5–12.1) years elapsed before a surgical diagnosis of endometriosis could be established in a

cohort of Brazilian women, seeking treatment for pain or infertility. Unfortunately, a very similar situation is observed in developed countries such as the USA and UK [34]. If the gynaecologist is able to determine the need for surgery based on signs or symptoms of disease and then can perform the complete surgical excision of DIE, including bowel resection, then the gynaecologist is the best doctor for that patient because the care of that patient has been comprehensive and not fractured among different physicians. The single-surgeon model would be of great help for the healthcare system because it would decrease costs, as preoperative tests, consultations and surgeons' fees would be limited. The model would also eliminate the need to coordinate office and surgery schedules of two (or more) surgeons, and surgery duration would probably be reduced with a single team of surgeons. As an example, Ferrero *et al.* [4^{*}] has recently evaluated fertility in a group of 46 patients after undergoing both laparotomic (28.2%) and laparoscopic (71.8%) bowel resection for endometriosis. The choice between both types of surgeries was based on the availability of a general surgeon who could perform the procedure by laparoscopy. The author found a higher pregnancy rate in the laparoscopy group in comparison to the laparotomy group (57.6 vs. 23.1%, $P = .035$). Therefore, it is possible that overall fertility rates would have been greater in this group of patients, if all the procedures could have been performed by laparoscopy by a single surgeon.

There has been increasing experience with the preoperative diagnosis of rectosigmoid endometriosis worldwide, either with MRI, transvaginal ultrasound after bowel preparation or transrectal ultrasound. Reported sensitivities and specificities for these methods are 86 and 92.9% [35], 97 and 100% [36], and 90 and 89.3% [37], respectively. Those are very encouraging results. An accurate preoperative diagnosis of bowel endometriosis could theoretically avoid its incidental finding during surgery in the hands of surgeons who might not be prepared to perform bowel resection. However, the expertise with these diagnostic methods is still restricted to tertiary centres and it is completely dependent on the radiologist experience, more than the method itself. If such results were reproducible worldwide, the natural history of endometriosis would be better understood, earlier noninvasive diagnostic would be possible, and persistence of disease would be readily diagnosed after surgeries, so they would not be treated as recurrences. But still, even if the surgeon has a preoperative scan demonstrating bowel disease, the final decision about what type of bowel surgery is needed is made only during surgery. The surgical technique will depend in the final analysis on what pathology is found at surgery, not on what the scan may or may not have found. For example, an originally planned LscDR might have to be changed for a LscSgR in the presence of a bigger or a second bowel

endometriotic lesion. Or, one should not need the presence of a colorectal surgeon in the operating room to perform a laparoscopic appendectomy, which is often necessary during laparoscopy for DIE. And, most important, if the scan is falsely negative for bowel endometriosis in a hospital setting where there is a multidisciplinary approach, a general surgeon may be absent for the procedure, whereas the über-surgeon would not be fazed by such an absence.

Each surgery has its specific types of complications. Bowel resection in the setting of DIE is associated with the possibility of a rectovaginal fistula if a hysterectomy or excision of vaginal endometriosis is done. Anastomosis dehiscence, peritonitis, pelvic abscess, urological iatrogenic lesions, bowel occlusion, temporary or persistent evacuatory or micturition dysfunctions, and sepsis are other risks [1**,13**,38,39]. It is the rate of surgical complications that is related to the number of cases performed and experience of the surgeon, not the type of complication. Accordingly, the clinical success rate is also directly related to a learning curve and development of experience [40*]. A comparison between the rates of surgical complications has been made between series of patients who underwent LscSgR and LscTADR by gynaecologist and colorectal surgeons, and they were found not to be statistically different [13**]. The single-surgeon model could reduce the rate of surgical complications, whereas a single surgeon would have more experience than any multidisciplinary team could have, as a multidisciplinary team may have several general surgeons to call upon.

Probably the surgical approach for LscSgR would be different in the hands of pelvic surgeons comparing to that of general surgeons. The association of the vaginal route is a good option for selected cases of bowel resection [19,20], and the gynaecologist surgeons are accustomed to the vaginal route for operations in their daily practice. The vaginal route is particularly useful for lower rectum dissection and may provide a better use of nerve-sparing techniques [20]. The surgeon may use the posterior colpotomy to exteriorize the proximal bowel segment for placement of the stapler anvil, which would avoid larger abdominal incisions and its associated morbidity (e.g., incisional hernias, abdominal wall collections of blood or serum, esthetically unwanted appearance) (Fig. 5). In the biggest reported series of LscBR performed by gynaecologic surgeons, the vaginal route was used for 69.6% of the cases of LscSgR, a very significant proportion that may represent an alternative approach for treating bowel endometriosis when performed by gynaecologic surgeons [13**].

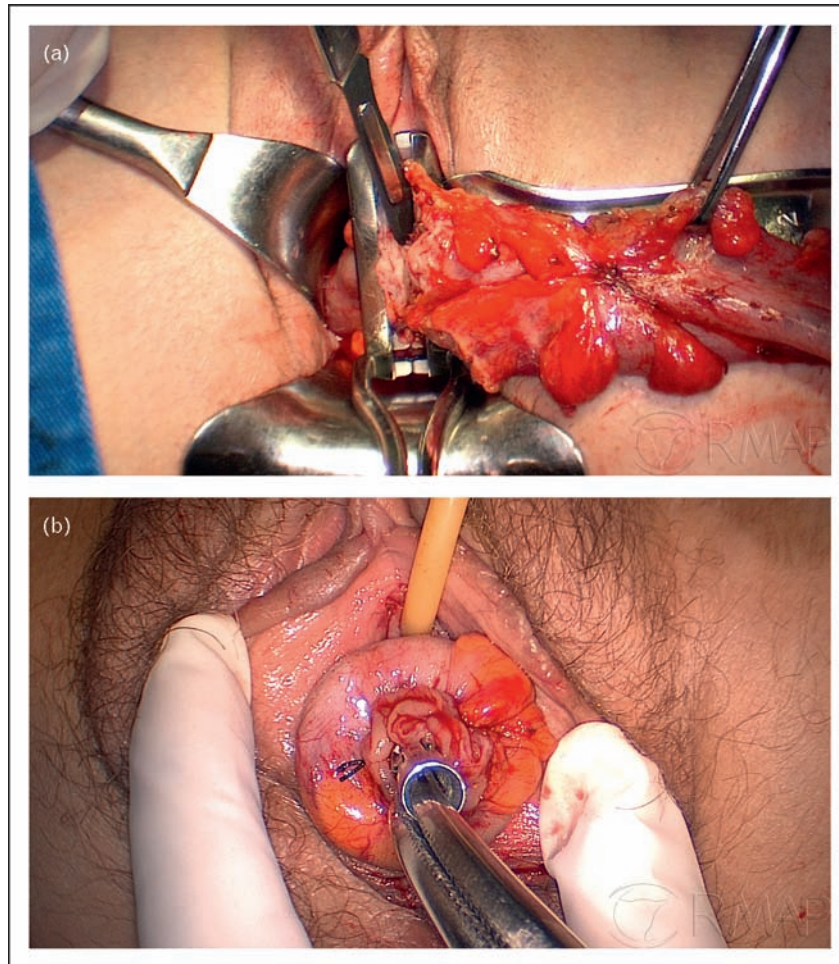
Perhaps the gaining of surgical experience would demonstrate that, in some patients, a partial-thickness, discoid

bowel resection might suffice, especially for rectal lesions, which could reduce the number of segmental bowel resections. Improvements in the understanding of bowel neuroanatomy, as well as the localization of rectal endometriotic lesions, would lead to more conservative bowel dissections especially in the distal part of the rectum. In turn, this could avoid both performances of very low or ultra low anastomosis as well as avoidance of protective ileostomies, as recently reported in a large series of LscSgR performed by a multidisciplinary team [21]. This is especially possible if we consider that bowel endometriotic lesions are more commonly situated at a minimum distance of 10–12 cm from the anal border [41]. For this same reason, routine diverting colostomies or ileostomies need not be performed. Darai *et al.* [38] compared two groups of patients who underwent LscSgR bowel resection during two distinct periods, and they were not able to demonstrate a reduction in the rate of rectovaginal fistula after starting performing routine protective colostomies. However, the author did demonstrate an increase in the number of major surgical procedures concomitantly performed (like nephrectomy, bladder resection, ureteral reimplantation, etc.) and yet a reduction in operating time (although not statistically significant), which corroborates the hypothesis that surgical experience may be the most important factor related to the ability of performing laparoscopic resection of DIE. The advantages of the single-surgeon model are highlighted in the following list:

- (1) Surgical experience concentrated in one single team of surgeons
- (2) Reduction of the rate of complications, as a single team of surgeons would have more experience than many teams of surgeons
- (3) Cost reduction for the healthcare system (reduction of preoperative consultations and examinations, reductions of medical honoraries)
- (4) Patient assurance that endometriosis would possibly be completely eradicated no matter in which organs they were found
- (5) No need to coordinate office and surgery schedules of two or more teams of surgeons
- (6) Pelvic laparoscopic surgeons would have less invasive surgical approaches and techniques for performance of LscBR than general surgeons, as surgical training would be specific for the particularities of bowel endometriosis.

Specific surgical training is mandatory for performing laparoscopic excision of deeply infiltrating endometriosis with bowel resection

The challenges and particularities of bowel endometriosis treatment have been summarized. It becomes

Figure 5 Laparoscopically assisted transvaginal segmental resection with sectioning of the proximal stump through vagina

(a) After laparoscopic mobilization of the rectosigmoid segment harbouring the endometriotic nodule and sectioning of the distal stump, the affected segment is exteriorized through a posterior colpotomy. Vaginal retractors are helpful for a suitable exposition. An intestinal clamp is placed in the limit of the proximal stump, and the segment is excised with knife. (b) the anvil of the circular stapler is positioned. A Kelly clamp holds the anvil of the circular stapler. The familiarity of the gynaecologists with the vaginal approach for surgeries may be helpful for the development of bowel resection techniques.

necessary to discuss what are the needs for the training of a pelvic laparoscopic surgeon. The pelvic surgeon is a medical professional who must have experience with advanced pelvic laparoscopic surgery and a clear understanding of the pelvic peritoneal and retroperitoneal anatomy, of the genital, urinary and gastrointestinal systems vascularization and visceral innervation. The surgeon must be able to perform laparoscopic suturing, both for extra and intracorporeal knots. Professional associations have already been providing courses aiming at acquisition of these abilities, as in those training courses for laparoscopic myomectomy, tubal anastomosis and hysterectomy.

Bowel resection techniques for rectosigmoid, ileum and appendix could be taught on animal models, possibly by these same category associations. Alternatively, gynaecologist, urologists and general surgeons could jointly

participate in procedures in tertiary centres until the moment that at least one of the professionals would have acquired the experience necessary to perform the whole procedure by him or herself [13^{••}]. The time of actuation of that professional would be of less importance as long as the surgeon had gained the necessary experience to perform the complete excision of the disease, no matter what organs are affected. The final decision of the best integration model should always be decided for the maximum benefit of patients. The surgeon would then learn the principles of manual and mechanical bowel anastomosis as well as the treatment of complications. As previously stated, it is the rate of complications that is associated to the surgeon experience, not the type of complication. If gynaecologic surgeons assume responsibility for performing bowel resections, they will improve their knowledge about the complications specifically associated to bowel resection and learn how to treat them.

This would also help caring for patients who undergo other gynaecological procedures (e.g., hysterectomies), which are not exempt from bowel complications [42].

National professional associations should be able to evaluate and to certify these professionals. Likewise, specific programs for continuous medical education (CME) could be developed for the area of 'pelvic laparoscopic surgery'. Great efforts should be made to select professionals who are able to give training for interested personnel. Nowadays, many medical residency programs around the world do include joining training for gynaecological and general surgeries, specifically for those in the bowel. Unfortunately, when the gynaecologist surgeons begin their daily clinical practice after finishing residency and transfer the responsibility of performing all types of bowel surgeries to the general surgeons, the gynaecologist is also abdicating the acquisition of skills and experience for the treatment of patients with pelvic endometriosis. Probably, the reason why gynaecologists do not routinely perform LscBR reflects more a deficiency during their surgical training than a possible medicolegal issue itself. In a reasonable period of time, it is expected that university medical residency programs would absorb the concept of "pelvic laparoscopic über-surgeon" and a new, more prepared type of surgeon professional would come out of the schools.

Conclusion

Endometriosis is a female pelvic disease. Surgical treatment of DIE requires a professional who is able to perform surgery in the gynaecological, urological, gastrointestinal and nervous structures of the pelvis, as the disease 'knows no boundaries'. Laparoscopic bowel resection for endometriosis may be necessary in up to one quarter of the patients undergoing surgery for endometriosis. It then becomes clearly necessary that the gynaecologist surgeon, the professional who most often cares for women affected by the disease, must be trained and prepared to perform bowel resections. A multidisciplinary team model with general surgeons has been used worldwide so far, but there are already reports of experiences with the single-surgeon model, that is, the gynaecologist surgeon performing all the pelvic excision of disease, including bowel disease [2,13**]. Results coming from these experiences are favourable, with similar rates of clinical amelioration and complications as those series with multidisciplinary teams. In addition, there might be clear advantages of the single-surgeon model in comparison with multiple-surgeons model, although it has not been scientifically evaluated. However, there is no scientific validation either that a multispecialty team approach is superior for the treatment of bowel endometriosis, which could also make the multi-surgeon model 'experimental' and therefore unethical. The feasibility of gynaecological surgeons to perform

bowel resections depends on the development of specific training programs, collaboration between surgical specialties, and professionals interested in the development of new skills to face the challenge of DIE, for the best care of the patients.

Acknowledgement

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References and recommended reading

Papers of particular interest, published within the annual period of review, have been highlighted as:

- of special interest
- of outstanding interest

Additional references related to this topic can also be found in the Current World Literature section in this issue (p. 359).

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