

Laparoscopic surgery for deep infiltrating endometriosis (DIE) - clinical management and outcome in a multidisciplinary center

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Abstract

Endometriosis is a benign disease with highly variable symptoms. The adequate treatment for symptomatic disease requires complete resection of all lesions. In advanced stages, bowel involvement is common. However, indications of colorectal resection for endometriosis remain controversial because of the risk of major complications. The aim of this study was to assess the feasibility of complete laparoscopic management of symptomatic deep pelvic endometriosis in a new multidisciplinary center in Romania. We included and retrospectively evaluated 74 patients treated for symptomatic deep infiltrating endometriosis in our institution between 2014 and 2015. In the majority of patients (97.3%), radical resection was achieved entirely using a minimally invasive surgical technique. Complications occurred in only 2 cases with anastomotic leakage in 1 patient and a rectovaginal fistula in another patient. A well-trained interdisciplinary team can perform the laparoscopic treatment of deep infiltrating endometriosis with low incidence of major complications and good clinical outcome.

Keywords: deep infiltrating endometriosis (DIE), laparoscopic surgery, clinical management

Introduction

Endometriosis is a chronic disease, which is under-diagnosed, under-reported, and under-researched. It is defined as the presence of endometrial tissue outside the uterus and is found in women of all ethnic and social groups⁽¹⁾.

Endometriosis is a disease with considerable prevalence, much more common than any genital cancer, that has been estimated to affect 10% to 15% of women of reproductive age⁽²⁾. Deep infiltrating endometriosis (DIE) is thought to account for approximately 40000 of the 480000 cases of endometriosis diagnosed in Romania, but this are rough estimates, as there are no reliable national statistics. DIE is defined by the presence endometrial implants, fibrosis, and muscular hyperplasia infiltrating deeper than 5 mm under the peritoneum⁽³⁾. Deep endometriosis involves, in descending order of frequency, the uterosacral ligaments, the rectosigmoid colon, the vagina, and the bladder⁽⁴⁾.

While the etiology of endometriosis still remains unclear, the mechanism most widely accepted for the development of the peritoneal endometriotic lesions is via retrograde menstruation. The other suggested mechanisms would be coelomic metaplasia, immune system abnormalities, genetic causes, environmental and lifestyle factors⁽⁵⁾. The main manifestations of endometriosis are primary or secondary dysmenorrhea, bleeding disturbances, infertility, dysuria, pain on

defecation (dyschezia), cycle-dependent or (later) cycle-independent pelvic pain, nonspecific cycle-associated gastrointestinal or urogenital symptoms⁽⁶⁾.

One of the difficulties in successfully treating and managing patients with endometriosis is the fact that the symptoms are often non-specific as they may mimic those associated with other chronic pain disorders, such as irritable bowel syndrome and pelvic inflammatory disease⁽⁷⁾. No blood test is accurate enough, although it has been noticed that levels of CA-125 may be elevated in endometriosis, but this test is not recommended for diagnostic purposes because of poor sensitivity and specificity⁽⁸⁾. Keeping this in mind, early diagnosis of pelvic endometriosis, and especially DIE, is a major challenge, as it can help to avoid mutilating surgery, improve quality of life, and enhance fertility⁽⁹⁾.

The revised American Society for Reproductive Medicine (rASRM) score is currently the best-known and most widely used classification of endometriosis. It is relatively easy to utilize, but it does not take into account the involvement of retroperitoneal structures with deeply infiltrating endometriosis⁽¹⁰⁾. On the other hand, advantages of the Enzian classification (frequently used in German-speaking countries) include the fact that the location and extent of involved retroperitoneal structures can be described with relative morphological precision. In conclusion, the rASRM score and the Enzian classification supplement each

other fairly well in describing the morphological extent of endometriosis⁽⁹⁾. Rectal endoscopic sonography, magnetic resonance imaging (MRI), and transvaginal sonography have also been recommended for diagnosing and locating DIE^(11,12).

The most important aspects in treating endometriosis are the following: attenuation of pain symptoms, improvement of fertility status and prevention of disease recurrence or progression.

The biology of endometriosis implies that the best way to treat symptomatic patients is with an individualized combination of surgery and endocrine (usually anti-estrogenic) pharmacotherapy, supported by complementary treatment approaches. Pharmacotherapy options include gestagens, oral contraceptive drugs, gonadotropin-releasing hormone analogues and analgesic. Laparoscopy is the gold standard for the surgical treatment of endometriosis⁽⁶⁾. The correct surgical treatment of deep infiltrating endometriosis means a complete surgical resection of all endometriosis implants.

The aim of the present study is to retrospectively evaluate the impact of laparoscopic surgical treatment of deep infiltrating endometriosis in a new multidisciplinary setting implemented in our private institution. Patients' clinical outcome was the most important factor to consider, as it could also help identifying possible impediments in the proper management. In point of fact, few experiences are published regarding the means by which this kind of facility can optimize coordination of accurate diagnosis, qualified preoperative assessment, interdisciplinary radical surgical treatment and standardized therapy to assure better outcomes for the DIE patients.

Methods

We present a retrospective evaluation of 74 patients who underwent laparoscopic surgery for deep DIE. During a period of 24 months (January 2014-December 2015) all patients treated for DIE in the Premiere Hospital (Timișoara) Gynecological Surgery Department were included and evaluated. Assessed patient parameters included age, associated

locations of DIE and previous surgery for endometriosis. Hospital records and electronic databases were reviewed for intra- and post-operative complications and recurrent symptoms requiring further treatment.

Pre-evaluation and preparation included a thorough clinical examination, imagistic exploration and assessment: transvaginal ultra-sonography (Figure 1), pelvic MRI (Figure 2), with or without colonoscopy and evaluation of the anti-mullerian hormone (AMH) levels.

Staging was performed in accordance to the rAFS and to the ENZIAN score. In all patients, a complete laparoscopic management was planned that included resection of all visible disease from the pelvic sidewall, rectovaginal septum and intestine.

Symptomatic bowel disease was indication for surgical bowel resection in all patients. Main preoperative patient complaints included dyspareunia and or dyschezia. Based on the intraoperative findings, bowel resection was performed in case of deep invasion of the bowel and shaving in superficial lesions. The surgeries were performed by a multidisciplinary team of laparoscopic gynecologists and colorectal surgeons with high level of expertise in performing this kind of interventions.

Additionally, urologic laparoscopic surgeons were consulted when cases involved ureteral and bladder invasion (Figure 3).

Shaving was performed when the lesion was under 3 cm and seemed not to involve the muscular layer or for a low lesion associated with colpectomy at a patient non-compliant with colostomy idea. Rectal resection was performed for large obstructing lesions, with involvement of the muscular layer, or for high lesions (Figure 4). Regarding the operative technique, whenever colorectal resection was required, the colon was mobilized and both ureters were visualized. The Douglas cavity was opened and the rectum was freed of mesorectal tissue before separating the colon caudal to the endometriotic nodule using an endostapler⁽¹¹⁾. If performed, protective colostomies were dismantled 6 weeks after.



Figure 1. Transvaginal ultrasound: DIE STAGE III, ENZIAN 2A, 2.4/1.5 cm recto-vaginal nodule that infiltrates the bowel serosa

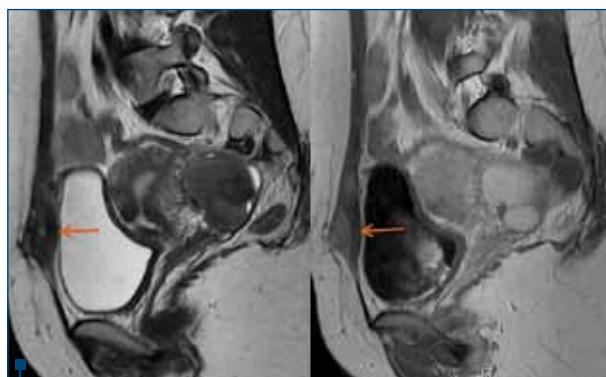


Figure 2. Pelvic MRI T1, T2: DIE STAGE III, ENZIAN 3B, Abdomino-pelvic wall endometriosis

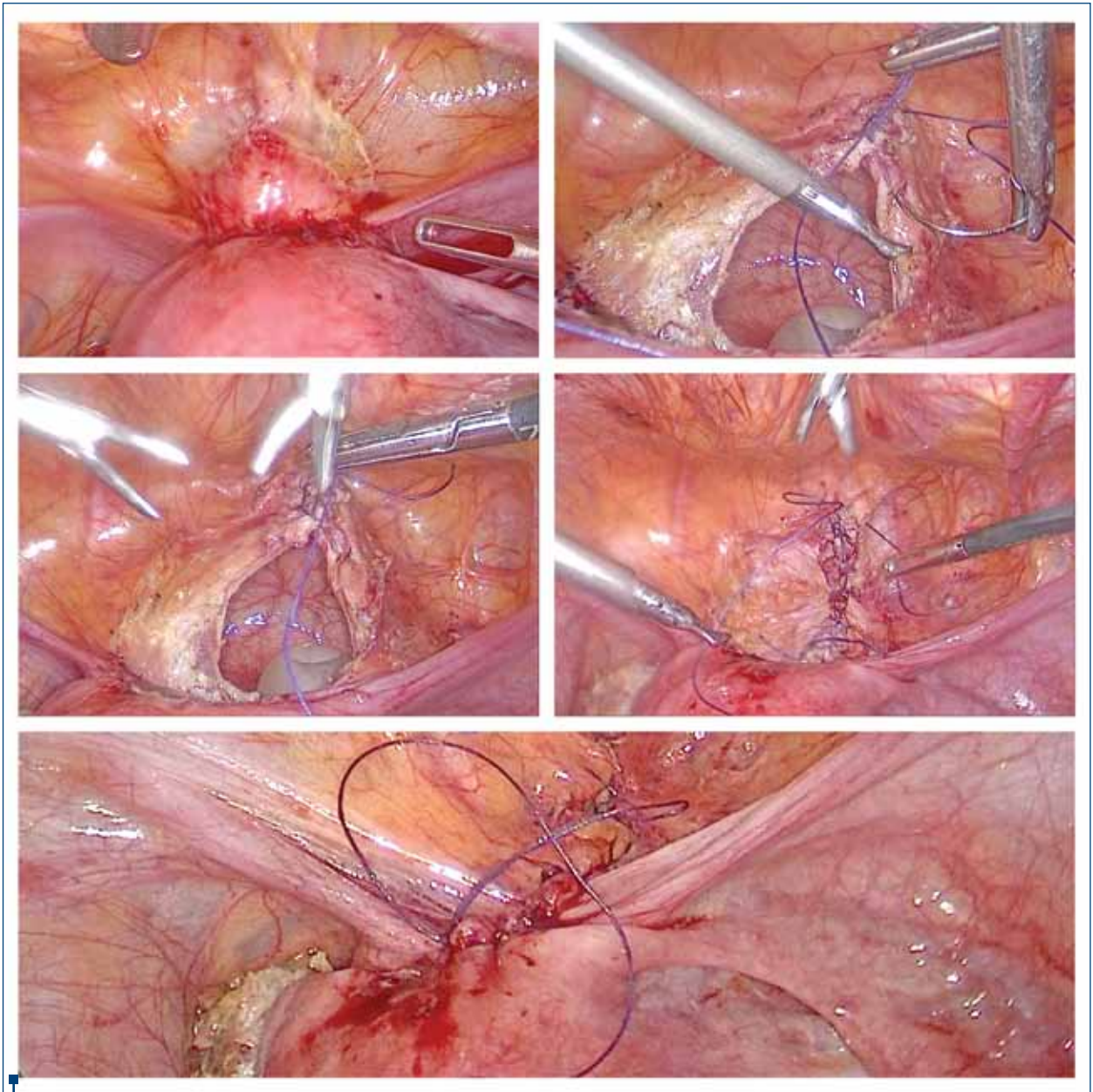


Figure 3. Bladder endometriotic nodule: laparoscopic resection and suture

Results

Characteristics of patients are listed in Table 1. Endometriosis implants were discovered intraoperatively as follows: in 39 patients in the rectovaginal septum (63.5%), in 24 patients in the uterosacral ligaments (32.4%), in 8 patients in the Douglas pouch (10.8%), in 15 patients in the rectosigmoid (20.2%), in 2 patients in the appendix and in 2 in the vagina. The ovaries were a frequent localization of endometriosis present in 33 patients (44.5%). Furthermore, 19 patients had ureter involvement (25.6%), 8 had bladder endometriosis (11%) and 2 patients had pelvic wall endometriosis. These intraoperative findings were consistent with

the preoperative diagnosis of DIE and are illustrated in Table 2.

For DIE staging we used the revised American Fertility Society (rAFS) score: 16 patients (22%) were classified with stage IV endometriosis, 34 patients with stage III (46%), 23 patients with stage II (31%) and one patient with stage I (1%). This staging modality showed advanced stages in the majority of the patients (Table 3). In addition, pre-operative ultrasound evaluation of DIE lesions was very similar to that performed laparoscopically, in concordance with Enzian classification. These results clearly show that transvaginal ultrasound is the first choice investigation if clinical suspicion is

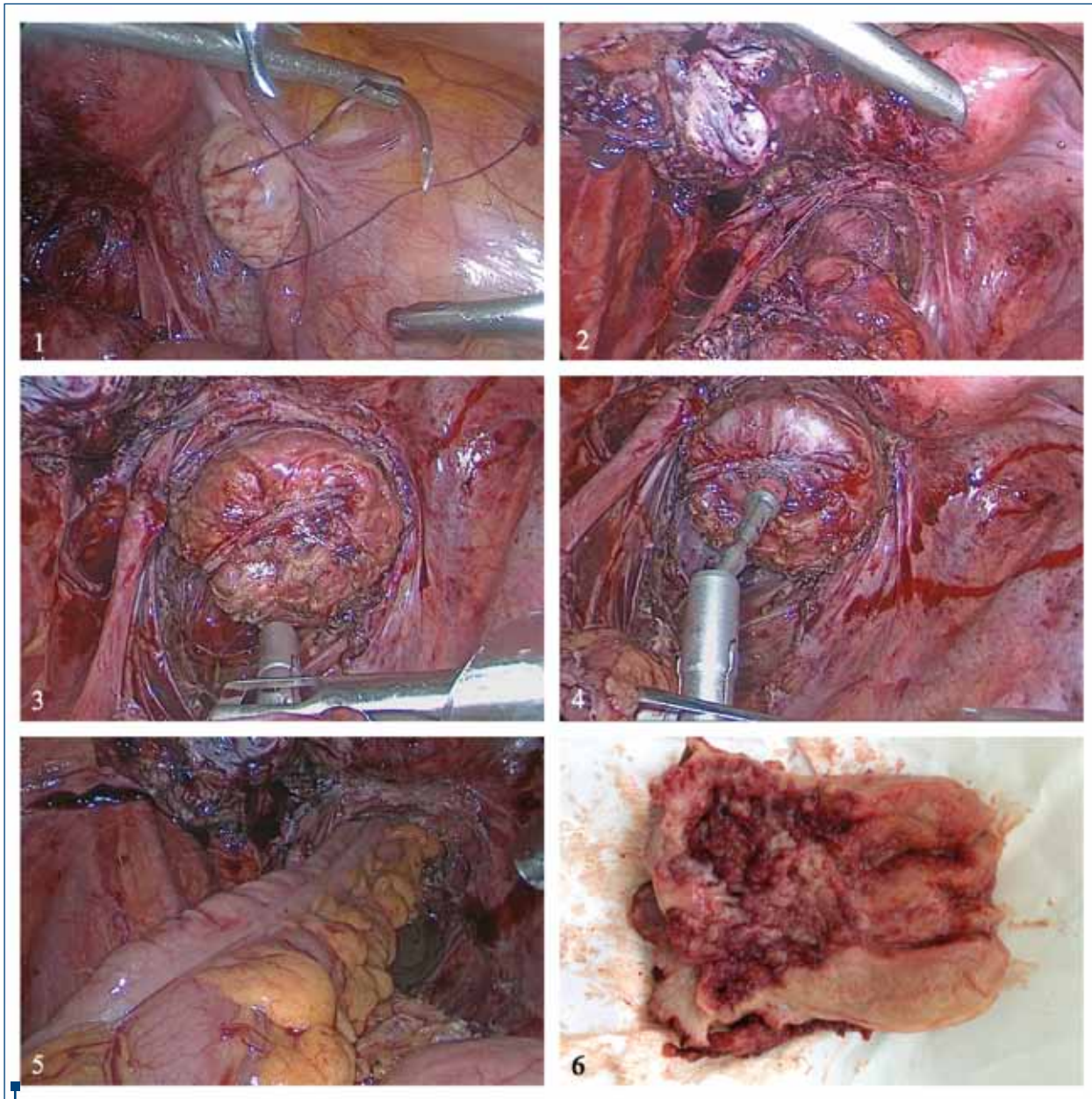


Figure 4. Rectal resection: 1. Ovarian suspension 2. Dissection and mobilization of rectum 3,4: Circular stapler anastomosis (anvil assembly) 5. Final aspect of mechanical anastomosis 6. Pathology specimen

present, with good sensibility and specificity in terms of disease staging.

In the vast majority of patients, more exactly 70 (97.4%), the surgical procedure was totally performed using minimally invasive surgical technique (Table 4). The most frequent intervention was rectal shaving in 29 patients (39.1%), while rectal resection was performed only in 12 patients (16.2%). Ovarian cystectomy was done in 31 patients (41.8%) and ovarian drainage in 4 patients. Extensive pelvic dissection was performed in 18 patients (24.3%), utero-sacral ligaments nodule resection in 24 patients (32.4%) and pouch of Douglas

nodule resection in 3 patients (4.0%). Bladder shaving was executed in 6 patients (8.1%), while partial resection was preferred in 3 cases (4.0%) (Figure 3). In 2 patients (2.7%), ureteral resection was necessary and therefore, anurologists was consulted. Vaginal shaving was performed in 3 patients (4.0%), while 6 patients (8.1%) benefited from posterior colpectomies. Appendectomy was performed in 2 patients (2.7%) and miomectomy in 3 patients (4.0%). If the surgery did not include bowel resection, the mean operative time was 183 ± 30 min. If bowel resection was performed, the mean operative time expanded to 257 ± 30 min.

Table 1 Patients' characteristics

Parameter	Results
Number of patients who underwent laparoscopic surgery	74
Median age	33.4 (21-49)
Number of previous surgery for endometriosis	
0	35
1	33
2	6

Table 2 Intraoperative findings

Location of endometriotic nodules	Number of patients (percentage %)
Rectovaginal septum	39 (63.5)
Uterosacral ligaments	24 (32.4)
Douglas pouch	8 (10.8)
Rectosigmoid	15 (20.2)
Small bowel	2 (2.7)
Appendix	2 (2.7)
Vagina	2 (2.7)
Ovaries	33 (44.5)
Bladder	8 (10.8)
Ureter	19 (25.6)
Uterus	4 (5.4)
Pelvic wall	2 (2.7)

Table 3 Intraoperative staging of endometriosis

rSAFS Staging	Number of patients (%)
Stage I	1 (1.3)
Stage II	23 (31.1)
Stage III	34 (45.9)
Stage IV	16 (21.6)

Table 4 | Surgical treatment

Surgical procedure	Number of patients (%)
Bowel	
■ Rectal shaving	29 (39.1)
■ Rectal resection	12 (16.2)
Bladder	
■ Shaving	6 (8.1)
■ Partial resection	3 (4.0)
Ureter	
■ Extensive pelvic dissection	18 (24.3)
■ Ureteral resection	2 (2.7)
Ovaries	
■ Cystectomy	31 (41.8)
■ Drainage	4 (5.4)
Vagina	
■ Shaving	3 (4.0)
■ Posterior colpectomy	6 (8.1)
Appendix	
■ Appendicectomy	2 (2.7)
Cul-de-sac Douglas	
■ Nodule resection	3 (4.0)
Utero-sacral ligaments	
■ Nodule resection	8 (10.8)
Uterus	
■ Myomectomy	3 (4.05)

Table 5 | Symptoms evaluation at follow-up

	Reduction at 1 month	Reduction at 3 month
Dysmenorrhea	- 4.2 VAS* points	- 4.5 VAS points
Pelvic pain	- 3.8 VAS points	- 4.7 VAS points
Bowel symptoms	100% rectal resection 85 % rectal shaving	
Urinary symptoms	100 % bladder resection 83 % bladder shaving	
AMH level (mU/dl)		- 1.1-1.4 unilateral cystectomy - 1.8 bilateral cystectomy
Dyspareunia	No sexual activity	- 3.6 VAS points

*VAS = Visual Analogue Scale

The mean blood loss for all operations was 257 ± 50 ml. The mean hospital stay in our private setting was 3.5 ± 1 days. Patients were discharged after they had returned to regular diet and normal peristalsis. Major complications occurred in 2 patients and included rectum anastomosis dehiscence in 1 patient (2.7%) and a rectovaginal fistula (2.7%) in another patient. Bowel occlusion and persistent bowel dysfunction did not occur. All major symptoms improved after surgery, as patients clearly stated at 1-month and 3-month follow-ups (Table 5). AMH levels had dropped 1.1-1.4 mU/dl after unilateral total cystectomy and 1.8 mU/dl after bilateral cystectomy. Associated DIE or smoking was associated with higher AMH drop-downs. AMH levels dropped just 0.2-0.25 mU/dl when evacuation of the ovarian endometrioma was performed solely. Regarding infertility, 49 patients from 74 had the wish to conceive. Clinical pregnancy rate (CPR) was 37% (18 pregnancies). Spontaneous conception was obtained in 20% of the patients (10 spontaneous pregnancies). 33% underwent *in vitro* fertilization, resulting in 8 assisted reproductive techniques (ART) pregnancies (17%). The total number of take-home babies was 13 (26%).

Discussion

Laparoscopic surgery for deep endometriosis still represents a challenge for most of laparoscopic pelvic surgeons, as its primary aim is to remove all endometriotic lesions. There is a mandatory need for the creation of endometriosis centers of excellence, as they provide a multidisciplinary approach and offer the optimal treatment in order to obtain the best outcomes. Multiple studies have shown significant improvement in patients' symptomatology such as: chronic pelvic pain, dysmenorrhea and dyspareunia after laparoscopic endometriosis surgery. The best surgical technique is subject of great controversy worldwide, as multiple operative techniques have been used with both advantages and disadvantages. Regarding the exact resection of endometriosis lesions, there is a lot of debate concerning the use of a more conservative approach versus an aggressive one, but clear guidelines for the management of colorectal endometriosis do not exist (12). When performing a less aggressive surgery, there is a risk of endometriosis recurrence and subsequent re-intervention. However, bowel occult microscopic endometriosis (BOME) in resection margins was analyzed in a study performed by Roman et al. on 103 patients managed by colorectal resection for DIE. The authors compared the rates of dyschezia, diarrhea, constipation, bloating and overall values of GIQLI and KESS scores at 1 year and 3 years postoperatively and demonstrated no statistical significance between women with and without BOME (found in 14% of specimen resection margins) (13).

"See and treat", "nerve sparing" and "tailored approach" are new concepts that were introduced during the last few years in laparoscopic surgical treatment of DIE. A tailored surgery is recommended as there are no clear guidelines and indications for the management of

colorectal endometriosis. Still, there are some indications for bowel resection such as: invasion of more than 50% of the bowel circumference, multiple nodules, or nodules larger than 3 cm (14).

On the other hand, some new and innovative techniques favor a minimally-invasive approach. For example, the so-called Rouen Technique includes laparoscopic deep shaving, followed by full-thickness disc excision using a semicircular trans-anal stapler, in order to remove the shaved rectal area. This technique offers significant improvement in patients' symptomatology, increase in their quality of life and remarkable chance for spontaneous conception (15).

The most common major complications following colorectal surgery are represented by anastomotic leakage and recto-vaginal fistula (16,17). However, clinical recurrence is significantly higher in women who did not undergo colorectal resection when bowel was involved (18). A minimal resection associated to a protective ileostomy when both vagina and rectum are involved represents the best option of treatment.

Different studies reported an incidence of complication varying from 1%-6%, at a mean rate of 4.7%. Nevertheless, bowel resection is considered to offer good operative outcomes and low and acceptable major complication rates (19,20). In our study, we performed rectal shaving in 29 patients and colorectal resection in 12 patients. Major complications were encountered in just 2 patients and as expected, they consisted in one anastomotic leakage and one recto-vaginal fistula. Nevertheless, our results can be compared with those reported in other studies regarding laparoscopic surgery for deep infiltrating endometriosis involving the colorectum, with a percentage of 4.8% complication rate. The correct preoperative evaluation of DIE is mandatory for obtaining the best postoperative results. Apart from the usual transvaginal ultrasound and the laparoscopic staging plus pathology report, the preoperative evaluation should also include MRI, and in specific cases with intestinal involvement, a virtual colonoscopy (21).

There are multiple possibilities of treating women with different stages of endometriosis who try to conceive. Patients with severe endometriosis, high pain scores and distorted anatomy should be operated radically regarding the disease, but conservatively regarding the function (22). If the ovarian reserve is impaired after surgery, they must be referred to an ART department. At the same time, if the ovarian reserve after surgery is good, spontaneous pregnancy should be attempted for 6 months. In addition, in patients with DIE and infertility after multiple failed *in vitro* fertilization intra-cytoplasmic sperm injection cycles and lack of CPR improvement, surgery must be considered (23).

Patients with impaired preoperative ovarian reserve, severe endometriosis and high pain scores should be treated according to their wishes. If the dominant wish is quality of life improvement, surgery is the first approach. Operation should follow a full and comprehensive discus-

sion with the patient about the implications of surgery on her fertility potential. If the main goal is fertility, they should be addressed to an ART department, but still, if they prove to be low or non responders, then surgery remains a good option⁽²⁴⁾. Those with mild and moderate endometriosis, with no or discrete pain symptoms and good ovarian reserve should not be operated, but assisted in conceiving naturally for 6 months, and thereafter referred to ART. On the other hand, patients with mild or moderate endometriosis, low pain scores, but impaired ovarian reserve, should be addressed directly to an ART department^(24,25).

Conclusions

In advanced stage of infiltration, the surgical management of deep infiltrating endometriosis demands elevated skills and therefore deserves a multidisciplinary setting.

Our center fulfills this desideratum, as it is the first of its kind in Romania specialized in treating endometriosis and DIE with good preliminary results.

Our approach is a tailored one, specific to every patient and it incorporates a certain preoperative algorithm, surgical attitude guided by nowadays principles in order to reduce complication rates, postoperative evaluation and multiple follow-up visits.

An overall unfriendly Romanian environment, lack of information and shortage of interest from the patients and physicians, as well as some limiting factors have made treating endometriosis to come to a standstill. Our treatment center aims to change this situation by improving our expertise, broadening our list of procedures, embracing a holistic approach and last but not least, raise awareness about endometriosis, an incurable and potentially crippling disease. ■

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