

# Intestinal endometriosis: the gynaecologist, the radiologist and the colo-rectal surgeon as a multidisciplinary team

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**Abstract:** Deep infiltrating endometriosis (DIE) is defined as infiltration by endometriotic tissue into anatomical structures and organs. Endometriotic tissue is composed of endometrial glands and stroma. DIE is a particular form of endometriosis and it occurs in 30–40% of women. Of all forms of intestinal endometriosis, 90% of cases, present with colorectal involvement with a significant impact on the quality of life of these patients. Although the deep infiltrative form of the disease is the most serious, generally being accompanied by severe symptoms at the site of infiltration of the endometriotic foci, no clear guidelines exist for the evaluation of patients with suspected bowel endometriosis. On the basis of recent evidence in literature, intestinal endometriosis is neither diagnosed nor managed in a standardized or appropriate manner. A very high number of patients receive “hit and miss” treatments, often resulting in surgery that does not eradicate the problem. A complete assessment and pre-surgical diagnosis of DIE is crucial. In this work we propose an operative model specifically designed to identify, treat and follow patients affected by intestinal endometriosis. The diagnostic-therapeutic run has to be standardized following a precise sequence of consultations: the gynaecologist must screen patients for DIE and refer them to a dedicated radiologist; the radiologist should both localize intestinal nodules and estimate the relationship between the depth of lesions and the percentage of the circumference of the bowel segment affected by the disease. In our opinion, at this point the patient benefits from a consultation with the colo-rectal surgeon specialized in treating low intestinal pathologies such as cancer or endometriosis. With this work philosophy, different specialists constitute part of an overall solution and treatment plan for each patient to manage their individual symptomatic profile.

**Key Words:** Intestinal endometriosis, Deep infiltrating endometriosis, Colorectal resection

## INTRODUCTION

Endometriosis is the presence of endometrial-like tissue outside the uterus that induces a chronic inflammatory reaction. This is predominantly found in women of reproductive age of all ethnic and social groups and generally associated with pelvic pain and infertility. Infertility problems can impact on the physical, mental and social well being of a woman and can have a profound effect on her life, including the ability to finish an education, maintain a career, or to create a family. For these reasons the European Union Written Declaration has recognized endometriosis as a disease with an important economic impact on the community demonstrating a significant association with health costs related to diagnostic delays and therapeutic expenses including surgery, drugs, and assisted reproductive technologies (ART).<sup>1</sup> Defining endometriosis as a ‘disease’, ‘illness’ and/or a ‘physiological phenomenon’ with a known cause or known triggers/mechanisms remains so far misunderstood by many scientists. Consequently, endometriosis remains a considerable challenge for those who attempt to identify and recognise the symptoms and signs of a disease that varies according to the location and severity of the implants, as well as the impact on the woman.

Pelvic pain is an important issue in the health care of women contributing to 10% of all outpatient gynaecological visits, 40% of laparoscopies and is the indication for 10% - 15% of hysterectomies.<sup>2</sup> The existence of a relationship between chronic pelvic pain symptoms and endometriosis is widely accepted, but various other painful pelvic symptoms are also normally present in the general population.<sup>3</sup>

Since there is no definitive criteria to determine whether the pain is actually caused by endometriosis both the American and the Royal Colleges of Obstetricians and Gynaecologists have recommended the empirical use of medical therapy before confirming a diagnosis of endometriosis.<sup>4</sup> However, endometriosis may be a progressive disease and laparoscopic diagnosis in patients suffering from this potentially serious condition could be appropriate.

Leaders in the field continue to support the need of a reliable non-invasive test to distinguish the pain between endometriosis and other causes since there is an approximate 10 year delay in the diagnosis of this pathology. This is generally because both women and family doctors tend to consider this type of pain as normal and neglect the need for treatment.<sup>5</sup>

Endometriosis therefore has to be considered a complex pathologic condition with unknown pathogenesis and various clinical manifestations. Women affected by the disease can have nil, mild or severe symptoms and these can be unrelated to the severity of the clinical syndrome (minimal, moderate or severe). At present, superficial endometriosis is considered a normal phenomenon in women in the childbearing years, whereas ovarian cysts and deep infiltrative endometriosis (DIE) are the more severe and generally painful manifestations of the condition. DIE is a particular form of endometriosis and occurs in up to 30%-40% of patients with endometriosis and has a characteristic penetration > 5 mm under the peritoneal surface.<sup>6</sup> These lesions are considered very active and are strongly symptomatic since DIE implants are found in specific locations, such as uterosacral ligaments, torus uterinus (retrocervical area of the uterus where the uterosacral ligaments join together), the posterior vaginal wall and the anterior rectal wall.<sup>7</sup> Endometriotic implants of the gastrointestinal (GI) tract occur in an estimated 5-37.5% of patients with endometriosis. The most commonly affected areas, in decreasing order of frequency, are the rectosigmoid colon, small intestine, cecum and appendix. The implants are usually serosal but can eventually erode through the subserosal layers and cause marked thickening and fibrosis of the muscularis propria. An intact overlying mucosa is almost always present, because the implanted tissue only rarely invades the mucosa. Inflammatory response to cyclic haemorrhage can lead to adhesions, bowel stricture even to gastrointestinal obstruction.<sup>8</sup>

Although the deep infiltrative form of the disease is the most serious, generally accompanied by severe symptoms

at the site of infiltration of the endometriotic foci, no clear guidelines exist for the evaluation of patients with suspected bowel endometriosis. This topic has been a source of great debate in recent literature concerning 2 issues: preoperative diagnosis and the optimal form of treatment. In this work we propose an operative model specifically designed to identify, treat and follow patients affected by intestinal endometriosis. With persistent and/or chronic diseases, continuity of care becomes the only stabilizing factor for the patient who needs ongoing treatment; our solution to this complex pathology is a centrally co-ordinated care for patients with endometriosis within a multi-disciplinary centre or network of accredited practitioners. The first step is therefore to assign a central gynaecologist to the woman seeking help for her endometriosis symptoms. This gynaecologist screens patients with pelvic pain, selects the suspect DIE cases and refers them to a dedicated radiologist. Our unit uses very sensitive diagnostic methods, enabling us to detect the presence and localization of intestinal endometriosis.<sup>9</sup> With the advances in diagnostic imaging methods that permit identification of the deepest layer and provide information such as the number of bowel lesions and the percentage of the circumference affected, it is possible that the decision regarding which type of procedure should be performed may be defined before surgery.<sup>10</sup>

In our opinion, it is only at this point that the patient benefits from a consultation with the colo-rectal surgeon specialized in treating low intestinal pathologies such as cancer or endometriosis. Surgical treatment of bowel endometriosis is associated with a significant rate of complications and any woman undergoing this type of surgery must be fully informed of the possible risks and complications by an appropriately trained and experienced surgeon.

With this work philosophy, different specialists constitute part of an overall solution in the treatment plan for each patient to manage their individual symptomatic profile.

## THE GYNECOLOGIST

The central gynaecologist must have continuously updated knowledge on all diagnostic and management options for symptomatic women with endometriosis. They are the one who works with the woman to co-ordinate and tailor-make her long-term treatment plan, depending on which symptoms need to be managed at any given time.

The first consultation of a patient referred for suspected endometriosis is crucial and lasts about 45 minutes. Great attention is paid to familial anamnesis, personal medical history, characterization of pain and quality of life beyond the current reason for the visit. The gynaecological examination has to reveal and localize the possible endometriotic lesions. A traditional speculum examination is done for full visual inspection of possible implants and a cotton-tipped swab should be used to evaluate both the cervical os and the paracervical/cervical tissues for tenderness. The manual portion of the pelvic examination should always be initiated with a single index finger, first noting any introital tenderness or spasm suggesting vaginismus. Next the levator ani muscles are palpated for tone and tenderness. Normally this palpation causes only a pressure sensation, but in patients with pelvic floor pain it may cause pain consistent with at least part of the patient's clinical pain symptoms.

The retrocervical area and the uterosacral ligaments should be palpated with great care in patients with suggestive endometriosis, because this is the most important location for endometriosis and is frequently associated with palpable nodules and indurations.<sup>11</sup> An easier evaluation can be made through a rectal examination rather than a vaginal examination. The cervix, paracervical areas and vaginal fornices should be transvaginally or transrectally palpated

with a single digit for tenderness or selective trigger points in order to identify endometriosis and to differentiate it from other problems such as repeated cervical trauma (usually from intercourse), pelvic infection and ureteral pain.<sup>12</sup> Unfortunately, it has been demonstrated by practitioners expert in managing this pathology that 50% of cases of laparoscopy-proven endometriosis had normal findings on preoperative pelvic examination.<sup>13</sup> This evidence and the need of an intranet solution allowing the radiologist and colo-rectal surgeon to work together forced us to develop a software to manage our cases of endometriosis. Different practitioners with their different sets of skills, play an important role in providing a holistic solution to an individual's needs; if all the specialists are connected and can communicate easily, the likelihood of positive, long-term results becomes greater. While the central gynaecologist may be situated in one place, it is unlikely that it is possible to gather the entire network's expertise underneath one roof. A viable solution has been to create a 'multi-disciplinary network of excellence' – a virtual centre – where specialists work in different locations but where (a) a central, shared electronic file for each patient is maintained and updated at every consultation carried out within the centre/network to ensure that every practitioner is kept continuously up to date and (b) where regular and formal interdisciplinary discussions regarding patient management are conducted.<sup>14</sup> Since 2006 our Unit has been using a dedicated software (IE-RING(c), Mediasoft Srl, Genoa, Italy)<sup>15</sup> to clinically manage cases of suspected and confirmed endometriosis (video-clip demonstration: <http://www.galliera.it/endometriosi/promoie.html>). The software's real-time calculation of the entered data provides a final score, defined as endometriosis index (EI) that quantifies the pathological status at the time of each consultation. This way all the data from each patient consultation or surgery is saved and accessible via hospital intranet.

The structure of the panels have been specifically designed for the integrated approach of different specialists according to recent data published in order to standardize entry criteria and outcome measures for clinical trials in endometriosis-related pain.<sup>16</sup> In particular, to screen women for the intestinal form of endometriosis, a panel of the electronic system is dedicated to comorbidities such as dyschezia and bowel function (figure 1). Our preliminary data shows significantly

| Alterazioni alvo    | Alterazioni urinarie | Mal di testa       |
|---------------------|----------------------|--------------------|
| stitichezza/diarrea | stranguria           | cefalea            |
| tenesmo             | tenesmo vescicale    | emicrania          |
| stitichezza         | pollachiuria         | cefalea a grappolo |
| diarrea             | disuria              |                    |
| ematochezia         |                      |                    |

SPA: 3,50

Fig. 1 – Panel 3 of IE-Ring Software. Induced dysfunction and physical alteration (SPA) is the result of the following subitems: intestinal symptoms (*Alternating constipation and diarrhoea + Rectal tenesmus + constipation + diarrhoea + Rectal pain*). Urinary symptoms and headache characterization follow.

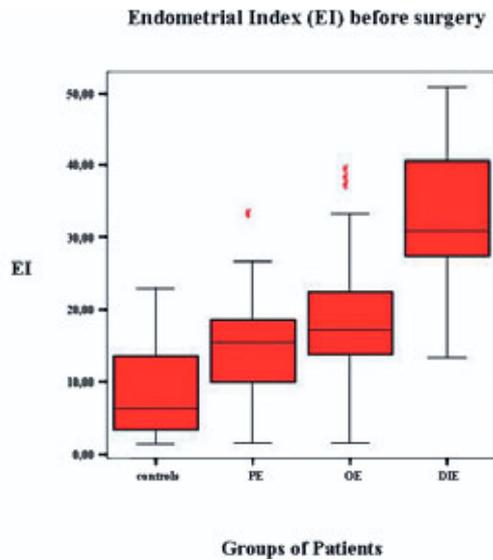


Fig. 2 – Endometrial Index (EI) before surgery. EI = Endometriosis Index. PE = peritoneal endometriosis. OE = ovarian endometriosis. DIE = Deep infiltrating endometriosis. The pre surgery EI calculated by our software in patients with proven DIE resulted in significantly higher values than those of women with no adhesions nor endometriosis. Kruskal Wallis test was used for the calculation of P; data are expressed as mean ± standard deviation. P for trend < 0.001 for each score.

higher EI values in patients affected by DIE compared to healthy women or with minor forms of endometriosis (figure 2, Table 1). This work methodology has allowed us to pre-operatively screen 29 cases of deep infiltrating endometriosis (22 were with intestinal localizations) out of 120 patients studied.

Each woman referred to the radiologist with suspect DIE needs to be informed in detail of the nature of this form of endometriosis. This step has to be considered as crucial by the primary gynaecologist in managing these cases because this is the starting point of the diagnostic run for DIE. Patients need to be psychologically ready to face the possible diagnosis during different examinations being aware both of the clinical implications and of the potential benefits. Once intestinal endometriosis has been confirmed by the radiologist (figures 3A-B) important discussion needs to take place with patients on topics such as that endometriosis is a benign condition and that after surgery the woman can expect a dramatic improvement in their quality of life. It is the duty of the primary gynaecologist to convey this, since each case is evaluated on the basis of the impact of the disease on the physical, mental and social well being of the patient. Only when the woman is fully informed and strongly motivated to perform multidisciplinary surgery will she be referred to the dedicated colorectal surgeon.

The surgical act is the starting point of the therapeutic run for DIE and can only be fully successful if the diagnostic run has optimally prepared both patient and practitioners.

THE RADIOLOGIST

*The imaging diagnosis of intestinal endometriosis*

The diagnosis of intestinal endometriosis is a controversial subject: surgery is the only available gold standard and imaging techniques are not considered as diagnostic methods for intestinal endometriosis. When DIE is suspected, it becomes essential to know in advance if an intestinal involvement exists, in order to plan preoperatively if an intestinal resection or an easy nodulectomy will be needed<sup>17</sup> and to obtain patient consent before surgery. Ultrasonography and MRI are the most diffuse and well

TABLE 1 – Clinical characteristics of patients. VAS = visual analogue scale; EI = endometriosis index; ASRM = American Society of Reproductive Medicine endometriosis score; data are expressed as mean ± standard deviation for continuous variables or as number (%) for categorical variables; Mann-Whitney test for continuous variables, Fisher exact test for categorical variables; † Independent sample t-test was used to test difference in mean age between groups.

|                                    | Deeply Infiltrating Endometriosis (n = 29) | No diagnosis of DIE (n = 91) | p†      |
|------------------------------------|--|------------------------------|---------|
| Age (years)                        | 35 ± 5                                     | 37 ± 6                       | 0.1     |
| Familiarity of endometriosis       | 2 (7)                                      | 2 (2)                        | 0.2     |
| Current infertility                | 15 (52)                                    | 31 (34)                      | 0.1     |
| Missed school/work (days/month)    | 8.3 ± 8.1                                  | 2.6 ± 4.6                    | < 0.001 |
| Sleep impairment (nights/month)    | 1.2 ± 2.3                                  | 0.4 ± 1.8                    | 0.006   |
| VAS for daily activity restriction | 5.3 ± 2.3                                  | 2.5 ± 2.4                    | < 0.001 |
| VAS for dysmenorrhea               | 7.7 ± 1.8                                  | 5.1 ± 3.2                    | < 0.001 |
| VAS for non menstrual pelvic pain  | 4.2 ± 3.0                                  | 2.0 ± 2.6                    | < 0.001 |
| VAS for dyspareunia                | 4.8 ± 3.2                                  | 2.2 ± 2.8                    | < 0.001 |
| ASRM score                         | 51.5 ± 31.5                                | 19.0 ± 24.9                  | < 0.001 |
| EI scores before surgery           | 33.0 ± 10.1                                | 14.9 ± 9.2                   | < 0.001 |
| EI scores after surgery            | 5.4 ± 3.1                                  | 3.9 ± 2.9                    | 0.01    |

\*VAS = visual analogue scale; EI = endometriosis index; ASRM = American Society of Reproductive Medicine endometriosis score; data are expressed as mean ± standard deviation for continuous variables or as number (%) for categorical variables; Mann-Whitney test for continuous variables, Fisher exact test for categorical variables; † Independent sample t-test was used to test difference in mean age between groups.

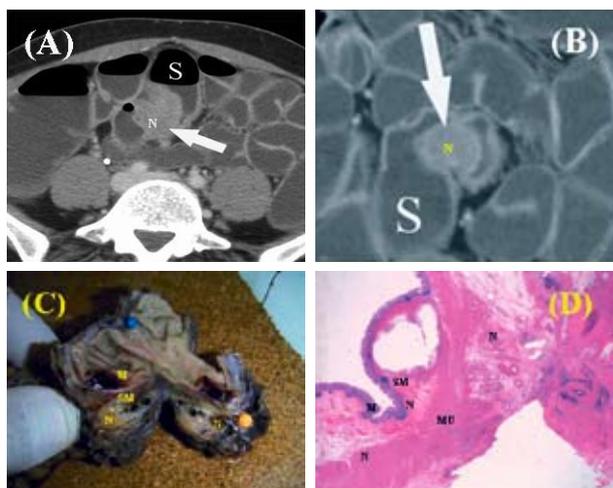


Fig. 3 – Intestinal endometriotic nodule. S = Sigmoid colon. N = endometriotic Nodule. M = Mucosal layer of intestine. SM = Sub-mucosal layer of intestine. MU = Muscular layer of intestine. (A) Axial scan of multislice CT: the arrow shows the nodule of infiltrating endometriosis. The homogenous margin of the nodule suggests that the mucosal layer is not infiltrated. (B) Coronal multislice CT reconstruction: the nodule involves the sub-mucosal layer and the regular profile bulges the mucosa, not infiltrated. (C) Photograph of the resected tract of sigmoid colon affected by endometriosis. (D) Hematoxylin-Eosin section of the tract of sigmoid colon massively infiltrated by endometriosis.

known imaging techniques in DIE detection.<sup>18</sup> These two techniques are both non invasive and have the advantage of being radiation free.

#### *The double contrast barium enema*

The double contrast barium enema is the classic radiological technique used in colon evaluation and scientific literature has long reported on the use of this technique in intestinal endometriosis detection.<sup>19</sup>

However, there are well known limitations to this imaging and diagnostic approach. The double contrast enema is a radiological technique targeted towards mucosal layer evaluation: its main limitation is the inability to investigate the anatomy around the colon. It is possible to visualize defects to the mucosal layer (tumours, polyps, diverticula and other endoluminal lesions) but pathologies outside the colon wall (abscesses, expansive masses, parapsychological impressions from other extraintestinal organs) are only indirectly detectable. Endometriosis involves the intestine from outside the wall, it is a pathology deriving from the peritoneum or from a sub-peritoneal space. Radiographic findings are constituted to and described as masses extrinsic to the colon wall, with irregular and speculated limits, determining thin defects of the parietal profile.<sup>20,19</sup> Because of this, more than one type of test must be carried out in order to distinguish endometriotic nodules from other wall anomalies (diverticula, neoplastic lesions, extraintestinal metastatic lesions with peritoneal diffusion), which can imitate the endometriotic pattern of the lesion.

#### *The Magnetic Resonance Imaging (MRI)*

Endometriotic lesions have a typical signal in MRI: high intensity in T1 weighted images and in T2 weighted images. This hyperintensity persists in the T1 weighted sequences after the fat suppression (fat sat techniques) giving diagnostic value to MR.<sup>21</sup> The haemorrhagic content of the nodules and the histologic structures (glands and epithelium) determine the signal pattern in MR sequences. Particularly in MRI the fat saturation technique is mandatory to complete the differential diagnosis between endometriotic lesions and

a teratoma.<sup>22</sup> When we use MRI criteria based on signal differences between T1 and T2 as above described, the sensibility and specificity referred to in literature to diagnose endometriosis are 90 and 98% respectively.<sup>23</sup> These principles can also be used to diagnose other endometriotic implants in the abdomen or pelvis. However, the structural components of the endometriotic nodule are variable and not always visible. The fibrotic component of the nodules is frequently high and they can be poorly vascularized, with a minimal content in gland and epithelium. These differences give a low nodule signal and a poor signal rising after i.v. paramagnetic contrast medium.

To detect an intestinal endometriotic lesion a careful study of the intestinal wall is needed: peristalsis and colonic content reduce image quality and limit its sensitivity. The challenge is to measure the depth of wall penetration to distinguish the adventitial lesion from nodules infiltrating the muscularis propria.

#### *The MSCT-enteroclysis*

Recently the MSCT-enteroclysis has been proposed as a method to detect and characterize such intestinal wall lesions of endometriotic origin. The intestine must be properly prepared before the study, in order to give an accurate and complete evaluation of the intestinal wall. The more frequently used intestinal cleansing protocol is similar to the pre-colonoscopy protocol. It is very important to clean the intestine without irritating the mucosa and to avoid using drugs that cause intensive mucosal irritation after cleansing. Just before the volumetric scan starts, the patient undergoes intestinal distension with a transparent enteroclysis, using water at physiological temperature (37°C) to limit patient discomfort. Around 2000-2200cc of water is used to obtain an homogeneous distension of the whole colon. Hypotonisation with Joscine bromide (Buscopan, Boehringer, Florence, Italy) injected i.v. or diluted in 30 cc of saline solution can also reduce patient discomfort and intestinal peristalsis. Using this method, parietal defects are detectable at the mucosal surface as well as around the intestinal wall. The contrast value windows between the intestinal lumen (hypodense because of the water inside), the intestinal wall (enhanced after the intravenous injection of the iodinated contrast medium) and the pericolic structures (fat, vessels, peritoneum, viscera), give an ideal visualization of the solid endometriotic nodules. The pharmacological hypotonisation reduces the risks due to peristalsis artifacts. Endometriotic nodules appear solid and poorly vascularized after the iodinated contrast medium injection (figures 3A-B). Intestinal involvement of endometriosis is different to other intestinal lesions, since it infiltrates the intestine from outside normally leaving the mucosa intact and not causing damage to the anatomy of the wall. This allows us to differentiate diagnosis with other pathologies of the intestinal wall, such as lymphoma or adenocarcinoma, deriving respectively from the submucosa and from the mucosal layer. The MSCT-enteroclysis technique has several advantages, it is a very quick method and provides us with a high temporal resolution: modern scanners can cover the whole abdomen in few seconds with a single volumetric acquisition. The radiation dose is greatly reduced and thanks to the variability of technical parameters it is possible to optimize x-ray techniques, especially since patients are normally of reproductive age.

However, MSCT findings of solid intestinal nodules always require the differential diagnosis between endometriotic nodules and other solid lesions involving the colon wall from the outside, for example ovarian cancer or peritoneal lesions. The main characteristic of MSCT-enteroclysis is that it could become a “one-stop-shop” technique in the preoperative management of intestinal endometriosis.

MSCT information is important for the gynecologist and his team in preoperative planning. By knowing if intestinal endometriosis is present and establishing whether other professionals, such as an urologist, are needed to be involved, all can guarantee a good surgical result.

#### THE COLORECTAL SURGEON

The colorectal surgeon (CRS) carries out both a diagnostic and therapeutic role in patients affected by intestinal endometriosis. In DIE, 22.7% of the nodules are located in the intestine and two thirds of these are found distally from the rectosigmoid junction.<sup>24</sup> The symptoms indicating intestinal involvement are constipation, tenesmus, perineal or rectal pain during defecation and more rarely rectal bleeding. They are often worse in correspondence with the time of menstruation and can sometimes be of such intensity that they can disable the patient.

During the diagnostic phase the CRS makes an appropriate anamnesis and a subsequent clinical examination including a proctoscopy. Two types of information can be deduced: the first is a confirmation of the DIE diagnosis, since its symptoms could also be attributed to other colo-proctological (CP) pathologies. The second is to give a presumable level of intestinal involvement, especially when the rectum is affected, as in the majority of cases.

Pelvic nodules are detected either through direct palpating or by causing pelvic pain through the anterior rectum wall. Bimanual digital exploration allows to completely evaluate the level of involvement of the rectovaginal septum. The preservation and functioning of the anal sphincters are also checked during the examination: this is extremely important should a lower rectal resection be necessary. The clinical exam is completed by a rigid proctoscopy. A vision of the mucosa allows us to evaluate its and possible cause for rectal bleeding. Rectal distention by air insufflation may trigger pelvic pain, while palpation of the anterior rectal wall with the proctoscope helps to localize the height of involvement by measuring its distance from the anus. An accurate diagnosis can therefore be made and the CRS is able to properly inform the patient about the extent of resection, its possible complications and the eventual need of a protective stoma in the case of a low colorectal or coloanal anastomosis.

Familiarity with this type of patient can also lead the CRS to recognize other possible DIE patients referred to him for constipation or pelvic pain. Moreover, the CRS could reach this type of diagnosis after investigating the duration of symptoms and the eventual association with dyspareunia and dysuria and refer them to the gynecologist. During surgery the CRS mobilizes the rectosigmoid tract starting on the left side allowing for an identification of the ureter which must be isolated up to its distal portion. During posterior bowel isolation it is important to both protect the superior hemorrhoidal artery and spare the hypogastric nerves until a sigmoid or rectal resection is decided. Access to mobilize the rectum is ideally gained through the avascular 'holy plane'. When the recto vaginal septum is involved a posterior isolation of the rectum below the nodule is advised, to better see the intestinal wall and the compromised area. This way, once the nodule is freed from the genital sides, the rectum is nearly completely distally isolated and ready for "en block" resection. The experience of the CRS is highly evident in the cases where an evaluation of how appropriate a local removal of a nodule infiltrating the intestinal wall at a superficial level must be made. This can be done using the peeling technique of the rectal wall or nodulectomy with partial resection or disk resection.<sup>25</sup>

The peeling technique has the advantage of preventing bowel opening but carries a greater risk of incomplete

excision, reported in literature as more than 67% [26-36]. Another risk is to miss a possible micro-perforation, which can be the cause of pelvic peritonitis in the post operative period. The hydropneumatic test (visualization of bubbles in the pelvis filled with water after air insufflation of the rectum) is a way to highlight their presence. It is often preferred to carry out segmental bowel resection with subsequent high or low colorectal anastomosis. Guidelines do not currently exist to help decide between nodulectomy or resection. The decision is still made on a case to case basis for the majority of patients, since different factors such as depth of infiltration, multicentricity of the nodules, involvement of the lymph nodes and their meaning can play a role in the decision making. Abrao et al. state that in 45 cases of endometriosis of the rectum, 42.2% of the cases had multiple lesions and 64% had mucosa and sub-mucosa involvement and of these 89% had more than 40% of the bowel involved. 94% of the cases also had the internal muscle layers involved.<sup>10</sup> This data supports the need for segmental resection in cases of recto sigmoid nodules. The frequency of multi focal lesions is also considered by Kavallaris and Remorgida as an indication of segmental resection.<sup>35,36</sup> In a study of 26 DIE consecutive cases of rectosigmoid resection 42.3% of the cases showed lymph nodal foci of endometriosis.<sup>37</sup>

Surgical experience is of paramount importance. This pathology, benign and affecting young patients, often shows very complex case situations of infiltration, involving the distal rectum and various extra intestinal structures (annexes, ureters, bladder, muscles and nerves). The procedure requires surgeons who can guarantee not only a low level of CR complications but also able to perform resections in laparoscopy. There are few abdominal pathologies like DIE, where video laparoscopy is best indicated. Video laparoscopy is considered the gold standard for DIE treatment, reducing post operative adhesions. It is well known how these may complicate possible further surgery and could cause post operative symptoms. Cosmetics reasons should not be underrated since patients are sometimes very young. In order to minimize alterations of the abdominal wall, the removal of the specimen, after rectal or colon resection, through the vagina has also been proposed:<sup>38</sup> in this study, conducted on 33 patients, dyspareunia was not found. The results of using video laparoscopy surgery to treat DIE show high rates of conversion. Generally, surgery complication levels are higher than those for cancer surgery. In the Emmenuel and Davis review<sup>39</sup> a generally accepted level varies between 10 and 30%, even if Jerby gives a reduced level of complications specific to resective surgery in video laparoscopy.<sup>40</sup> The incidence of anastomotic fistula varies between 0 and 17%, while the incidence of a recto vaginal fistula is higher than 10%. In more than 30% of cases changes in urinary and intestinal functions are found. As mentioned before, it is necessary to carry out a temporary stoma in a notable number of patients (between 2 and 10%) while this becomes definitive in 0 to 6% of patients. It is difficult to discriminate between the effect of resection from the other associated procedures when considering the remission of symptoms in resected patients. The little long term data in literature shows that patients submitted to intestinal resection have a complete remission of pelvic pain with follow up varying between 15 and 40.5 months.<sup>41-45</sup> Dubernard recently demonstrated how the QOL SF-36 can forecast the improvement in the quality of life after colon resection due to endometriosis through laparoscopy and how this improvement is highly significant in the majority of patients.<sup>46</sup> Few studies refer to the fertility outcome after intestinal resection due to DIE: data varies between 23 and 52%. Many of these patients have undergone associated procedures such as annessiectomies, removal of ovarian cysts and hysterectomies. It is therefore very difficult to evaluate the impact of intestinal resection on fertility and

further studies are needed. Much rests in the understanding and exploration of DIE and prospective multicentric studies on a high number of patients with adequate follow up are necessary to verify the impact of treatment. These studies necessitate a classification instrument of patients and their pathology, such as the one proposed in this paper. This would record cases consistently, provide a specific database and reference point for the various professionals involved, constituting an essential instrument for scientific progression in this subject.

## CONCLUSIONS

As awareness increases towards endometriosis and the full effects of its impact on the quality of lives of the women affected come to light, the need to work on adding information on etiology, physiopathology and natural history of intestinal DIE becomes more urgent.

On the basis of recent evidence in literature, intestinal endometriosis is neither often diagnosed nor managed in a standardized or appropriate manner. A very high number of patients receive "hit and miss" treatments, often resulting in surgery that does not eradicate the real problem. This is the main reason that explains the difficulty of understanding if we have a real recurrence of endometriosis or a disease that has never been treated, despite previous operations. The MSCT-enteroclysis and MRI play complementary roles in DIE diagnosis. They are crucial in recognizing deep endometriosis and in detecting intestinal wall infiltration. These techniques need to have a more established position in the diagnostic approach of DIE. The future imaging of DIE probably will be, in the majority of cases, "x-ray free": our goal must be to improve the MR approach, which up to now has not always been used in intestinal infiltration detection. In order to detect DIE we must evaluate the recto-sigmoid colon wall during pelvic examination and a combined study named MR-enteroclysis of the colon must be further developed. A complete assessment and pre-surgical diagnosis of DIE is crucial. These steps have to be made by the Gynecologist, Radiologist and CRS in a multidisciplinary setting in order to be able to provide all the necessary information to the patient and obtain their consensus before surgery. The team should have a standardized and validated score to quantify both the aggressiveness of the disease on different organs and on the quality of life of these women. We propose software assistance in order to save and analyze all the clinical variables from patients before surgery; this instrumental support would allow to evaluate the real benefits of surgery on DIE in an objective way.

Once a correct diagnosis is made we consider it mandatory to decide with the patient, whether or not to perform intestinal surgery. It is presumed that a unique and radical operation gives the best chance for a long lasting full recovery and a better quality of life.

It is very important to identify the real indication for surgery and the wishes of the woman at this stage. The possible scenarios are essentially three: low quality of life, infertility and a low quality of life associated to infertility. Endometriosis is not a malign condition and radical surgery can have major complications (intestinal, urinary, vascular etc); in the diagnostic-therapeutic run we propose that the patient decides on their own 'customised' treatment.

Once intestinal surgery is accepted by the patient, the operation has to be radical and when possible performed laparoscopically. The endoscopic approach gives better cosmetic and functional results, and reduces risks connected to intestinal adhesions. The operative modalities have to be decided based on factors such as motivation, age, maternity desire and comorbidities of the patient. The surgery has to be multidisciplinary and performed by a dedicated and trained

team of a colo-rectal surgeon and gynaecologist who are also expert in laparoscopy. In our opinion gynaecologists, radiologists and colo-rectal surgeons have to coordinate their efforts in order to create centres dedicated to patients affected by intestinal DIE and to promote a flow of information both on the existence and the prevalence of this pathological condition and develop consensus statements on his treatment.

It is mandatory for the immediate future to stimulate clinical research with prospective multicentric studies enrolling patients who are then classified and treated in a standardized manner.

## REFERENCES

1. Bianconi L, Hummelshoj L, Coccia ME, et al. Recognizing endometriosis as a social disease: the European Union-encouraged Italian Senate approach. *Fertil Steril* 2007;88: 1285-1287.
2. Gelbaya TA, El-Halwagy HE. Focus on primary care: chronic pelvic pain in women. *Obstet Gynecol Surv* 2001;56: 757-764.
3. Hurd WW. Criteria that indicate endometriosis is the cause of chronic pelvic pain. *Obstet Gynecol* 1998; 92: 1029-1032.
4. Garry R. Diagnosis of endometriosis and pelvic pain. *Fertil Steril* 2006;86: 1307-1309; discussion 1317.
5. Kennedy S. Should a diagnosis of endometriosis be sought in all symptomatic women? *Fertil Steril* 2006; 86: 1312-1313; discussion 1317.
6. Koninckx PR, Meuleman C, Oosterlynck D, Cornillie FJ. Diagnosis of deep endometriosis by clinical examination during menstruation and plasma CA-125 concentration. *Fertil Steril* 1996;65: 280-287.
7. De Ceglie A, Bilardi C, Bianchi S, et al. Acute small bowel obstruction caused by endometriosis: A case report and review of the literature. *World J Gastroenterol* 2008;14: 3430-3434.
8. Park SB, Kim JK, Cho KS. Sonography of endometriosis in infrequent sites. *J Clin Ultrasound* 2008;36: 91-97.
9. Biscaldi E, Ferrero S, Fulcheri E, et al. Multi-slice CT enteroclysis in the diagnosis of bowel endometriosis. *Eur Radiol* 2007;17: 211-219.
10. Abrao MS, Podgaec S, Dias JA, et al. Endometriosis lesions that compromise the rectum deeper than the inner muscularis layer have more than 40% of the circumference of the rectum affected by the disease. *J Minim Invasive Gynecol* 2008;15: 280-285.
11. Garry R. The effectiveness of laparoscopic excision of endometriosis. *Curr Opin Obstet Gynecol* 2004;16: 299-303.
12. Howard FM. Chronic pelvic pain. *Obstet Gynecol* 2003;101: 594-611.
13. Eskenazi B, Warner M, Bonsignore L et al. Validation study of non-surgical diagnosis of endometriosis. *Fertil Steril* 2001;76: 929-935.
14. D'Hooghe T, Hummelshoj L. Multi-disciplinary centres/networks of excellence for endometriosis management and research: a proposal. *Hum Reprod* 2006;21: 2743-2748.
15. Reina SA, Reina VM, Debbia EA. Records matching model for data survey on applied and experimental microbiology. *New Microbiol* 2007;30: 35-44.
16. Vincent K, Kennedy S, Stratton P. Pain scoring in endometriosis: entry criteria and outcome measures for clinical trials. Report from the Art and Science of Endometriosis meeting. *Fertil Steril* 2008.
17. Darai E, Bazot M, Rouzier R, Houry S, Dubernard G. Outcome of laparoscopic colorectal resection for endometriosis. *Curr Opin Obstet Gynecol* 2007;19: 308-313.
18. Bazot M, Nassar J, Darai E, et al. Value of sonography and MR imaging for the evaluation of deep pelvic endometriosis. *J Radiol* 2005;86: 461-467.
19. Gordon RL, Evers K, Kressel HY et al. Double-contrast enema in pelvic endometriosis. *AJR Am J Roentgenol* 1982;138: 549-552.
20. Landi S, Barbieri F, Fiaccavento A et al. Preoperative double-contrast barium enema in patients with suspected intestinal endometriosis. *J Am Assoc Gynecol Laparosc* 2004;11: 223-228.

21. Sugimura K, Okizuka H, Imaoka I et al. Pelvic endometriosis: detection and diagnosis with chemical shift MR imaging. *Radiology* 1993;188: 435-438.
22. Yamashita Y, Torashima M, Hatanaka Y et al. Value of phase-shift gradient-echo MR imaging in the differentiation of pelvic lesions with high signal intensity at T1-weighted imaging. *Radiology* 1994;191: 759-764.
23. Togashi K, Sato Y, Yazawa M. Mediastinal parathyroid cyst. *Nippon Kyobu Geka Gakkai Zasshi* 1991;39: 1117-1120.
24. Chapron C, Chopin N, Borghese B et al. Deeply infiltrating endometriosis: pathogenetic implications of the anatomical distribution. *Hum Reprod* 2006;21: 1839-1845.
25. Landi S, Pontrelli G, Surico D et al. Laparoscopic disk resection for bowel endometriosis using a circular stapler and a new endoscopic method to control postoperative bleeding from the stapler line. *J Am Coll Surg* 2008;207: 205-209.
26. Tran KT, Kuijpers HC, Willemsen WN, Bulten H. Surgical treatment of symptomatic rectosigmoid endometriosis. *Eur J Surg* 1996;162: 139-141.
27. Possover M, Diebolder H, Plaul K, Schneider A. Laparoscopically assisted vaginal resection of rectovaginal endometriosis. *Obstet Gynecol* 2000;96: 304-307.
28. Hollett-Caines J, Vilos GA, Penava DA. Laparoscopic mobilization of the rectosigmoid and excision of the obliterated cul-de-sac. *J Am Assoc Gynecol Laparosc* 2003;10: 190-194.
29. Darai E, Thomassin I, Barranger E et al. Feasibility and clinical outcome of laparoscopic colorectal resection for endometriosis. *Am J Obstet Gynecol* 2005;192: 394-400.
30. Golfier F, Sabra M. Surgical management of endometriosis. *J Gynecol Obstet Biol Reprod (Paris)* 2007;36: 162-172.
31. Camagna O, Dhainaut C, Dupuis O et al. Surgical management of rectovaginal septum endometriosis from a continuous series of 50 cases. *Gynecol Obstet Fertil* 2004;32: 199-209.
32. Keckstein J, Wiesinger H. Deep endometriosis, including intestinal involvement--the interdisciplinary approach. *Minim Invasive Ther Allied Technol* 2005;14: 160-166.
33. Fedele L, Bianchi S, Zanconato G, Bettoni G, Gotsch F. Long-term follow-up after conservative surgery for rectovaginal endometriosis. *Am J Obstet Gynecol* 2004;190: 1020-1024.
34. Houtmeyers P, Ceelen W, Gillardin JM, Dhondt M, Pattyn P. Surgery for gastrointestinal endometriosis: indications and results. *Acta Chir Belg* 2006;106: 413-416.
35. Kavallaris A, Kohler C, Kuhne-Heid R, Schneider A. Histopathological extent of rectal invasion by rectovaginal endometriosis. *Hum Reprod* 2003;18: 1323-1327.
36. Remorgida V, Ragni N, Ferrero S et al. How complete is full thickness disc resection of bowel endometriotic lesions? A prospective surgical and histological study. *Hum Reprod* 2005;20: 2317-2320.
37. Noel JC, Chapron C, Fayt I, Anaf V. Lymph node involvement and lymphovascular invasion in deep infiltrating rectosigmoid endometriosis. *Fertil Steril* 2008;89: 1069-1072.
38. Ghezzi F, Cromi A, Ciravolo G et al. A new laparoscopic-transvaginal technique for rectosigmoid resection in patients with endometriosis. *Fertil Steril* 2008;90: 1964-1968.
39. Emmanuel KR, Davis C. Outcomes and treatment options in rectovaginal endometriosis. *Curr Opin Obstet Gynecol* 2005;17: 399-402.
40. Jerby BL, Kessler H, Falcone T, Milsom JW. Laparoscopic management of colorectal endometriosis. *Surg Endosc* 1999;13: 1125-1128.
41. Fleisch MC, Xafis D, De Bruyne F et al. Radical resection of invasive endometriosis with bowel or bladder involvement--long-term results. *Eur J Obstet Gynecol Reprod Biol* 2005;123: 224-229.
42. Thomassin I, Bazot M, Detchev R et al. Symptoms before and after surgical removal of colorectal endometriosis that are assessed by magnetic resonance imaging and rectal endoscopic sonography. *Am J Obstet Gynecol* 2004;190: 1264-1271.
43. Campagnacci R, Perretta S, Guerrieri M et al. Laparoscopic colorectal resection for endometriosis. *Surg Endosc* 2005;19: 662-664.
44. Dubernard G, Piketty M, Rouzier R et al. Quality of life after laparoscopic colorectal resection for endometriosis. *Hum Reprod* 2006;21: 1243-1247.
45. Darai E, Ackerman G, Bazot M, Rouzier R, Dubernard G. Laparoscopic segmental colorectal resection for endometriosis: limits and complications. *Surg Endosc* 2007;21: 1572-1577.
46. Dubernard G, Rouzier R, David-Montefiore E, Bazot M, Darai E. Use of the SF-36 questionnaire to predict quality-of-life improvement after laparoscopic colorectal resection for endometriosis. *Hum Reprod* 2008;23: 846-851.

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