

Rectosigmoid Endometriosis: Endoscopic Ultrasound Features and Clinical Implications

G. Roseau¹, I. Dumontier¹, L. Palazzo¹, C. Chapron², B. Dousset³, S. Chaussade¹, J. B. Dubuisson², D. Couturier¹

¹Dept. of Gastroenterology, Cochin Hospital, Paris, France

²Dept. of Gynecology, Cochin Hospital, Paris, France

³Dept. of Digestive Surgery, Cochin Hospital, Paris, France

Background and Study Aims: The main area of the gastrointestinal tract affected by deep pelvic endometriosis is the rectosigmoid colon in 3–37% of cases. Due to the risk of infiltration and the clinical symptoms of endometriosis, with pain and infertility, the condition may require surgical resection. Preoperative imaging diagnosis of rectosigmoid involvement is therefore important. Rectal endoscopic ultrasonography (EUS), which is already used for the staging of anorectal carcinoma and submucosal lesions, may be a promising technique for this indication. The present study was conducted in order to describe the endosonographic appearance of rectosigmoid endometriosis, and to define the potential relevance of the technique to the choice of resection method.

Patients and Methods: Between 1993 and 1997, 46 women (mean age 31) with deep pelvic endometriosis underwent imaging investigations and surgical resection. The clinical and imaging findings, and the surgical and histological features identified – mainly with regard to infiltration of the rectal wall – were compared retrospectively. The impact of the EUS findings on the decision

on whether or not to carry out resection, either by laparoscopy or open abdominal surgery, was also examined.

Results: When there was deep pelvic endometriosis with suspected rectal wall infiltration, EUS showed normal anatomy in nine patients, endometriotic lesions without rectal wall infiltration in 12, and typical rectal infiltration in 25. The lesions were confirmed by the surgical findings during therapeutic laparoscopy (n=22) and laparotomy (n=25), as well as by clinical follow-up. Rectal wall infiltration, demonstrated in all cases using EUS, had initially been suspected on the basis of clinical examinations, rectoscopy, barium enema, computed tomography, and magnetic resonance imaging in 62%, 50%, 33%, 67% and 66% of cases, respectively.

Conclusions: EUS is a simple and noninvasive technique capable of correctly diagnosing rectal wall infiltration in deep pelvic endometriosis. It may be helpful in determining the choice between laparoscopy and laparotomy when complete resection is indicated.

Introduction

Endometriosis is defined as the presence of functioning endometrial tissue outside the uterus, and the condition affects 5–20% of menstruating women [1,2]. Deeply infiltrating endometriosis – histologically defined as tissue penetration of stroma and ectopic glands at least 5 mm long – in most cases affects the uterosacral ligaments. The rectovaginal septum and vesicouterine space [3] may also be involved to a lesser extent, and the rectosigmoid colon is affected more rarely, in 3–37% of patients. The main symptoms are infertility and refractory pain, the intensity of

which depends on the extent of tissue infiltration [4]. According to some authors, such locations require primary surgical treatment, as medical therapy is only palliative and temporary in effect [5–9]. Preoperative imaging is therefore needed in order to define the extent of the lesions and to diagnose the extent of rectosigmoid infiltration. Barium enema radiography and colonoscopy are not accurate enough, with sensitivities of only 54% and 51%, respectively, and there have been few reports on the use of other imaging methods [3,10,11]. Among the other possible imaging methods, rectal endosonography appears promising [12–14]. The aim of the present study was to describe the appearance of rectosigmoid endometriosis on endoscopic ultrasonography (EUS) and to define the implications of this technique for the choice of resection method.

Patients and Methods

Patients

Forty-six women (mean age 31 years, range 22–46) who were treated for deep pelvic endometriosis between 1993 and 1997 were included in this retrospective study. All had undergone preoperative investigation with EUS, and had histological confirmation of endometriosis.

Thirty-five of the patients (76%) had previously undergone one or more operations, including laparoscopy (n = 48) and laparotomy (n = 13), with hysterectomy (n = 2) and ovariectomy (unilateral in nine patients and bilateral in two). Thirty-two of the patients (70%) had received preoperative medical treatment with progesterone or luteinizing hormone-releasing hormone (LH-RH) analogs during the previous 6–12 months.

Thirty-eight patients (83%) had dysmenorrhea, which was considered severe in 70% of the cases. Dyspareunia was reported in 29 patients (63%), and pelvic pain was described as chronic in 19 cases (41%), or was associated with gastrointestinal symptoms in 16 (35%). Nineteen of the women (41%) were affected by infertility.

Vaginal palpation was normal in four of the patients (10%), and revealed abnormalities in all of the others. Infiltration of uterosacral ligaments, alone or combined with the rectovaginal septum, or a palpable nodule, were the most common findings. Rectal palpation, performed during the initial examination in 16 patients, raised a suspicion of rectal infiltration in only 10 cases.

Complementary Examinations

Rectal endoscopic ultrasonography was carried out using an Olympus GF-UM20 scope, with 7.5 MHz and 12 MHz probes allowing circumferential imaging of the rectum and surrounding areas. The examination was conducted without sedation, after a rectal enema, and lasted for an average of 20 min. The flexible nature of the echo endoscope allowed the transducer to be positioned in the distal sigmoid, after which it was slowly withdrawn while the intestinal wall and surroundings were studied (ovaries, uterosacral ligaments, pouch of Douglas, rectovaginal septum). Instilling water into the bowel lumen and around the balloon probe helped produce clear visualization of the five familiar layers of the gastrointestinal wall [13,14], particularly on the anterior and lateral sides of the rectum, where endometriosis is usually located. The imaging appearance of endometriosis was one of hypoechoic masses adjacent to or infiltrating the rectum and sigmoid [11,12]. The rectovaginal and anovaginal septa were also explored using different ultrasound ranges, in order to search for associated small nodules of endometriosis that may mimic the appearance of vessels in these locations.

The rectal EUS findings (Figures 1–3) were compared with the results of the surgical exploration and histological examination. Three different patterns were identified:

- Normal EUS anatomy, with no visible lesion.
- Endometriotic retroperitoneal infiltration, with no involvement of the bowel wall.
- Endometriotic infiltration of the bowel wall, extending at least to the rectal muscularis propria.

Other examinations conducted were rectosigmoidoscopy, which always preceded EUS, and other imaging methods, mostly in patients who underwent laparotomy: barium enema in 24 cases, high-resolution computed tomography (CT) in 21, and magnetic resonance imaging (MRI) in 12.

Based on preliminary experience in our own department and elsewhere [15,16], we judged that resection of endometriosis with rectosigmoid involvement could be complete only when carried out using laparotomy. When the EUS imaging was compatible with this type of infiltration, the patients were therefore offered laparotomy. Comparisons between the EUS findings, surgical findings, and his-

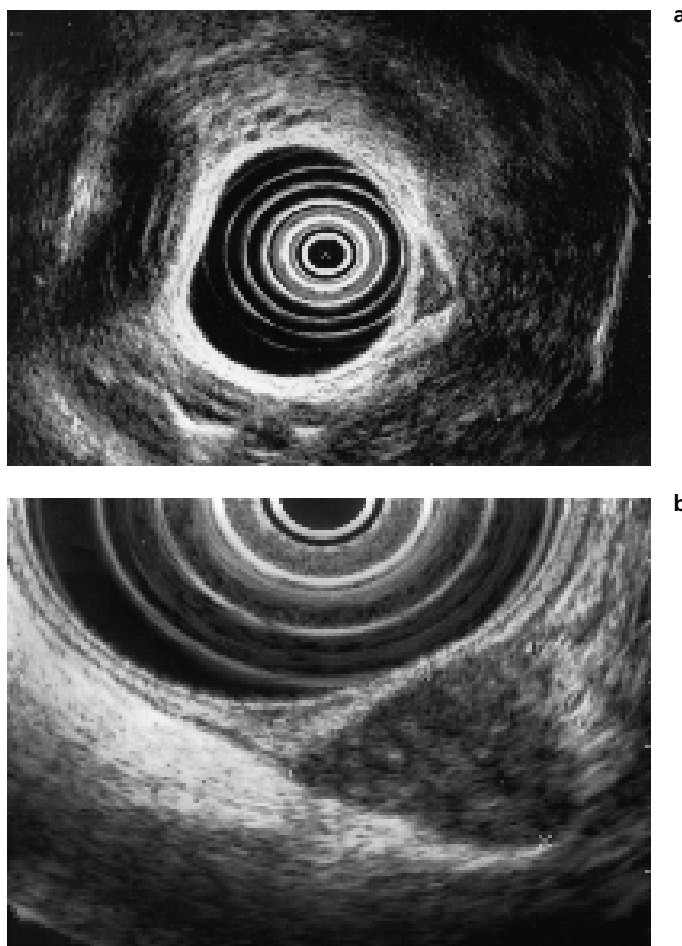


Figure 1 **a** Endometriosis from the posterior side of uterus is seen infiltrating the rectosigmoid junction on the right side of the image. The infiltration is limited to the muscularis propria. On the left side, the hypoechoic image corresponds to a vertebra. **b** Enlarged image of the same lesion



Figure 2 In this case, the rectal endometriotic infiltration is also affecting part of the submucosa

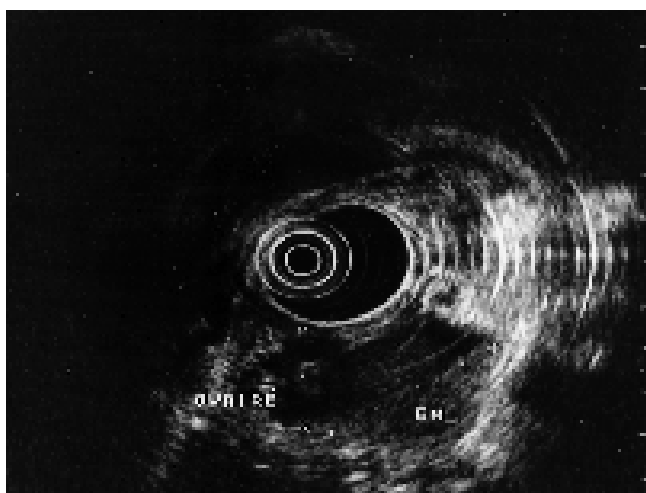


Figure 3 A cystic ovary ("ovaire") and a cystic pelvic endometrioma (EM) are seen here next to a normal rectal wall

tological specimens were made in these cases. In the other patients, in whom EUS imaging had not identified rectosigmoid endometriosis, laparoscopy was performed initially.

Results

EUS imaging features. The EUS findings were regarded as normal in nine patients (20%). In these patients, no images compatible with a pelvic nodule of endometriosis were seen either between the uterus and rectum, or on the anterior and lateral sides of the rectum and sigmoid.

In 12 patients (26%), EUS revealed an image compatible with deep pelvic endometriosis without infiltration of the intestinal wall. These lesions, with a diameter of 25 ± 10 mm (10–50 mm), were hypoechoic or even partly anechoic, corresponding to liquid. The boundaries were smooth, but with the largest lesions it was not possible to explore the outer limits precisely. Hypoechoic images of

this type were compatible with infiltration of the uterosacral ligaments and/or rectovaginal septum, without rectal or sigmoid infiltration. Even when there was close contact between the endometriotic nodules and the rectal or sigmoid wall in these patients, no parietal thickening was demonstrated, and the five-layered pattern was always normal (Figure 3).

In 25 patients (54%), the EUS findings were compatible with deep infiltration of the intestinal wall. The muscularis propria (the fourth layer) was then clearly infiltrated or thickened in contact with a pelvic endometriotic nodule. In some patients, the third layer, partly corresponding to the submucosa, was also thickened.

Other endosonographic findings included: liquid in the pouch of Douglas, which was seen in two-thirds of patients, irrespective of the endometriotic images; ovarian cysts, identified in 11 patients; and inflammatory lymph nodes in four.

Impact of EUS on the treatment decision, and comparison of the histological and imaging results. As mentioned above, the patients underwent laparotomy or laparoscopy, depending on the endosonographic suspicion of bowel endometriosis. In the 46 patients studied, this choice was not influenced by other morphological examinations.

Laparotomy. Twenty-four of the 25 patients in whom bowel infiltration was suspected at EUS received laparotomies, and all of them underwent bowel resection. Sixteen had a total proctectomy with low colorectal or coloanal anastomosis, and seven had a total proctectomy with protected coloanal anastomosis; one patient received a patch excision. Apart from resection, the following procedures were performed, alone or in combination: uterosacral ligament resection (n=18); unilateral (n=11) or bilateral (n=4) adnexectomy; cystectomy (n=5); vaginal resection (n=5); cecal resection (n=2); appendectomy (n=1); and hysterectomy (n=4). One patient refused major surgery, and accepted the possibility that laparoscopic treatment might only be partial.

Laparoscopic surgery. Twenty-two patients underwent laparoscopic surgical treatment. The deep endometriotic lesions were excised, and the uterosacral ligaments were resected; in five cases (22.7%), this resection was bilateral. These 22 patients consisted of nine patients with no endometriotic lesions identified on EUS, 12 with endometriotic pelvic images but a normal rectosigmoid wall, and the one patient mentioned above who refused laparotomy and intestinal resection. In 21 cases, laparoscopic surgical resection of the deep endometriotic lesions was considered to be complete without breaching the intestinal wall. In the one patient in whom bowel infiltration had been suspected at EUS, the excision was only partial, without bowel resection. In the patients receiving laparoscopic surgery (n=22), the following procedures (sometimes more than one in the same patient) were combined with resection of

the uterosacral ligaments: intraperitoneal cystectomy (n=4), vaginal resection (n=1), adhesiolysis (n=6), and coagulation of superficial endometriotic lesions (n=16).

Histology. Histological confirmation of endometriotic lesions was obtained in the 24 patients who underwent bowel resection by laparotomy. In all of these cases, the infiltration of the intestinal wall by endometriotic lesions that had been suggested by the EUS imaging was confirmed. In these 24 patients, bowel infiltration had only been suspected in ten of 16 (62%) during the initial rectal palpation, in 12 of the 24 (50%) at rectoscopy, in eight of the 24 (33%) on the barium enema, in 14 of 21 (67%) on CT, and in eight of 12 (66%) on MRI. On T2-weighted sequences, MRI also correctly imaged pelvic endometriosis as a mass extending from the lateral and posterior part of the uterus, with a signal of intermediate and high intensity, with either fibrotic, solid, fluid, or hemorrhagic components. In the 22 patients who received laparoscopic treatment, endometriotic lesions were also histologically confirmed. However, no proof of bowel wall integrity was obtained, although the surgeon reported complete resection in all patients but one.

Follow-up. In both groups of patients, with an average follow-up period of 2.5 years, the functional results were regarded as excellent. Pain significantly decreased in more than 90% of the patients, with complete freedom from pain in 80%. Complications included rectovaginal fistulas in three patients, all of whom required surgical treatment; transient neurogenic bladder in six patients; and necrosis of the vault of the vagina in one case. Both of the latter conditions were treated medically.

Discussion

Deeply infiltrating endometriosis is defined as a specific disease, and many authors consider that it requires surgical resection [15, 16]. The extent of the excision required is relative to the spread of the lesions [17]. When there is endometriosis in the gastrointestinal tract, secondary to deep infiltration of the intestinal wall, it should also be resected [18, 19]. It is difficult to diagnose rectosigmoid infiltration by endometriosis on a clinical examination, and the usual imaging investigations, such as barium enema, rectosigmoidoscopy, and CT, provide little information [1–3]. So far as we are aware, only one clinical report has been published concerning the value of endovaginal ultrasonography for this diagnosis [11]. Rectal EUS, initially used for the staging of rectal cancer, has also been studied in the evaluation of external compressions and submucosal lesions [20, 21]. More recently, it has come into use in gynecology, and a few studies have been published reporting its advantages in the field of deep endometriosis [11, 12, 24]. In a previous preliminary retrospective study including 14 patients, we described EUS imaging of rectosigmoid lesions [12]. The study by Ohba et al. included 93 patients examined using a linear probe. Endometrial infiltration of the uterosacral ligaments was described as producing a thick, irregular image. The authors concluded that this type of in-

filtration was always associated with clinical symptoms, but there was no mention of rectal involvement [24].

The present study is the first one in which EUS has been used to diagnose and evaluate rectosigmoid wall infiltration in patients with histologically confirmed retroperitoneal pelvic endometriosis. The main lesions involve infiltration by pelvic endometriotic nodules on the anterior side of the rectosigmoid junction, corresponding to involvement of the uterosacral ligament (Figure 1a). The radial probes used in this series, with frequencies of 7.5 and 12 MHz, are particularly useful for demonstrating infiltration of the intestinal wall by endometriosis. Precise assessment of whether the muscularis propria is involved – alone or in association with the submucosa – appears possible, as well as accurate measurement of the depth of infiltration. Other anatomical signs may also be demonstrated, such as ovarian cysts, inflammatory lymph nodes, and liquid in the pouch of Douglas.

With regard to the therapeutic implications of the procedure, the present study shows that when EUS is used prospectively, it allows rectosigmoid infiltration to be identified and staged whenever it exists. Based on our treatment approach, excision of the lesions by laparotomy was offered to all 25 patients in whom EUS had demonstrated this infiltration. In the 24 who accepted surgery, the anatomic and histopathological results confirmed the existence of deep rectosigmoid endometriosis. Similarly, in the 21 patients in whom EUS indicated that there was no deep bowel infiltration, we were able to excise the retroperitoneal endometriotic lesions by laparoscopic surgery without opening the bowel lumen. These results confirm that in comparison with the imaging methods usually employed – barium enema radiography, colonoscopy, and CT – EUS is better able to demonstrate deep rectosigmoid endometriotic infiltration. In the patients who underwent laparoscopic surgery, the positive predictive value of EUS in demonstrating intestinal endometrial involvement was 100%. The main limitation of this study lies in the absence of histological confirmation of a normal sigmoid in the patients who were treated laparoscopically. However, the laparoscopic description of the lesions and the good functional results in all of the groups are indirect arguments for a good level of accuracy using EUS.

When EUS imaging was carried out before treatment in patients presenting with extensive deep endometriotic lesions, two groups of patients were defined, and two different types of therapeutic management were used. Laparotomy and intestinal surgery were performed when rectosigmoid endometriosis was identified on EUS. Despite the progress that has been made in laparoscopic surgery, which has allowed treatment of some types of colorectal pathology, we believe that surgery via laparotomy still remains the best way of treating deep rectosigmoid endometriosis. A few reports have suggested that it may be possible to carry out bowel resection laparoscopically, but the results are still preliminary [25, 26]. Laparoscopic bowel resection

might possibly be feasible when there is very limited rectosigmoid endometriosis, but the difficulty of the procedure, which requires extremely skilled surgeons, and the risk of bowel complications should be borne in mind [27].

Conclusions

Although encouraging, the results of the present study will still need to be validated by further prospective studies including larger numbers of patients. More precise identification is needed of the patients who require this type of examination, and the best type of probe to be used for it will need to be determined. More detailed definition of the characteristic sonographic images will be required, and it will need to be assessed whether a radial probe is sufficient for the preoperative pelvic investigation. Finally, the respective roles of MRI and EUS for preoperative staging will need to be studied. Our own view is that that radial probes do not appear to be capable of evaluating perirectosigmoid endometriosis satisfactorily; they failed to demonstrate the uterosacral ligaments except when the initial part was infiltrated by endometriosis. It was also not possible to follow the boundaries of the nodules fully beyond a diameter of 3–4 cm. In addition, in patients with normal EUS findings, the laparoscopic exploration identified endometriotic nodules that had not been seen on EUS. All of these limitations could be overcome by using EUS probes in which lower frequencies of 5 MHz are available, and a complete ultrasound examination would require the use of different frequencies and both linear and radial probes in the same session.

At present, MRI can be recommended for the evaluation of pelvic deep endometriosis [26], with supplementary EUS being used only to identify intestinal involvement. However, EUS using radial probes is already a very accurate and noninvasive procedure for assessing the presence or absence of rectosigmoid infiltration by endometriosis. When the procedure is carried out preoperatively, it makes it possible to distinguish between patients in whom bowel resection is indicated, and those who can be treated by laparoscopic surgery without broaching the bowel.

Acknowledgments

This study was presented as an abstract at the American Society for Gastrointestinal Endoscopy meeting held in New Orleans on 17–20 May 1998 (*Gastrointestinal Endoscopy* 1998; 47: 519).

References

- ¹ Singh KK, Lessells AM, Adam DJ, et al. Presentation of endometriosis to general surgeons: a 10 year experience. *Br J Surg* 1995; 82: 1349–1351
- ² Olive DL, Schwartz LB. Endometriosis. *N Engl J Med* 1993; 328: 1759–1769
- ³ Zwas FR, Lyon FR. Endometriosis: an important condition in clinical gastroenterology. *Dig Dis Sci* 1991; 36: 353–364
- ⁴ Koninckx PR, Lesaffre E, Meuleman C, et al. Suggestive evidence that pelvic endometriosis is a progressive disease whereas deeply infiltrating endometriosis is associated with pelvic pain. *Fertil Steril* 1991; 55: 759–765
- ⁵ Donnez J, Nisolle M, Casanas-Roux F, et al. Rectovaginal septum, endometriosis or adenomyosis: laparoscopic management in a series of 231 patients. *Hum Reprod* 1995; 10: 630–635
- ⁶ Tran KT, Kuijpers HC, Willemsen WN, Bulten H. Surgical treatment of symptomatic rectosigmoid endometriosis. *Eur J Surg* 1996; 162: 139–141
- ⁷ Coronado C, Bailey HR, Franklin RR, et al. Surgical treatment of symptomatic colorectal endometriosis. *Fertil Steril* 1990; 53: 411–416
- ⁸ Wingfield M, Healy DL. Endometriosis: medical therapy. *Baillière's Clin Obstet Gynaecol* 1993; 7: 813–838
- ⁹ Waller KG, Shaw RW. Gonadotropin-releasing hormone analogues for the treatment of endometriosis: long-term follow-up. *Fertil Steril* 1993; 59: 511–515
- ¹⁰ Togashi K, Nishimura K, Kimura I, et al. Endometrial cysts: diagnosis with MR imaging. *Radiology* 1991; 180: 73–78
- ¹¹ Gorell HA, Cyr DR, Wang KY, Greer BE. Rectosigmoid endometriosis: diagnosis using endovaginal sonography. *J Ultrasound Med* 1989; 8: 459–461
- ¹² Roseau G, Palazzo L, Cornier E, et al. Endometriose rectosigmoidienne: diagnostic par échoendoscopie. *Med Chir Dig* 1993; 22: 20–21
- ¹³ Rösch T, Lorenz R, Classen M. Endoscopic ultrasonography in the evaluation of colon and rectal disease. *Gastrointest Endosc* 1990; 36: S33–S39
- ¹⁴ Roseau G, Palazzo L, Paolaggi JA. Endoscopic ultrasonography in colorectal diseases. *Biomed Pharmacother* 1992; 46: 133–138
- ¹⁵ Chapron C, Dubuisson JB. Laparoscopic treatment of deep endometriosis located to the uterosacral ligaments. *Hum Reprod* 1996; 11: 868–873
- ¹⁶ Cameron IC, Rogers S, Collins MC, Reed MWR. Intestinal endometriosis: presentation, investigation, and surgical management. *Int J Colorect Dis* 1995; 10: 83–86
- ¹⁷ Cornillie FJ, Oosterlynck D, Lauweryns JM, Koninckx PR. Deeply infiltrating pelvic endometriosis: histology and clinical significance. *Fertil Steril* 1990; 53: 978–983
- ¹⁸ Collin GR, Russel JC. Endometriosis of the colon: its diagnosis and management. *Ann Surg* 1990; 56: 275–279
- ¹⁹ Weed JC, Ray JE. Endometriosis of the bowel. *Obstet Gynecol* 1987; 69: 727–730
- ²⁰ Glaser F, Schlag P, Herfarth C. Endorectal ultrasonography for the assessment of invasion of rectal tumours and lymph node involvement. *Br J Surg* 1990; 77: 883–887
- ²¹ Hildebrandt U, Feifel G, Ecker KW. Rectal endosonography. *Baillière's Clin Gastroenterol* 1989; 3: 531–541
- ²² Kameyama H, Niwa Y, Arisawa T, et al. Endoscopic ultrasonography in the diagnosis of submucosal lesions of the large intestine. *Gastrointest Endosc* 1997; 46: 406–411

- ²³ Vedel-Castillo D, Boulant J, Canis M, et al. Apport de l'échoendoscopie rectale dans la stratégie opératoire d'une endométriose de la cloison rectovaginale. *Gastroenterol Clin Biol* 1997; 21: A40
- ²⁴ Ohba T, Mizutani H, Maeda T, et al. Evaluation of endometriosis in utero-sacral ligaments by transrectal ultrasonography. *Hum Reprod* 1996; 11: 2014–2017
- ²⁵ Redwine DB, Koning M, Sharpe DR. Laparoscopically assisted transvaginal segmental resection of the rectosigmoid colon for endometriosis. *Fertil Steril* 1996; 65: 193–197
- ²⁶ Koninckx PR, Timmermans B, Meuleman C, Penninckx F. Complications of CO₂ laser endoscopic excision of deep endometriosis. *Hum Reprod* 1996; 11: 2263–2268
- ²⁷ Schröder J, Löhnert M, Doniec JM, Dohrmann P. Endoluminal ultrasound diagnosis and operative management of rectal endometriosis. *Dis Colon Rectum* 1997; 40: 614–617
- ²⁸ Zawin M, McCarthy S, Scoutt L, Comite F. Endometriosis: appearance and detection at MR imaging. *Radiology* 1989; 171: 693–696

Corresponding Author

G. Roseau, M.D.

Dept. of Gastroenterology
Hôpital Cochin
27, rue du Faubourg Saint-Jacques
75014 Paris
France

Fax: +33-1-42 34 50 09

Submitted: 18 August 1999

Accepted after Revision: 7 March 2000

Abstract in French:

L'endométriose pelvienne profonde peut atteindre le rectosigmoïde dans à 37% des cas. L'importance de l'infiltration et de la symptomatologie clinique, douleurs et stérilité, justifient souvent un traitement chirurgical. Il est alors important de rechercher une localisation digestive avant l'intervention. L'échoendoscopie rectale (EE), qui est déjà utilisée pour le bilan préthérapeutique des cancers du rectum et des tumeurs sous-muqueuses, pourrait être proposée dans cette indication. Les buts de cette étude étaient de décrire les aspects échoendoscopiques de l'endométriose rectosigmoïdienne, et de préciser la place de cette technique dans le choix des méthodes de résection.

Méthodes: De 1993 à 1997, 46 femmes atteintes d'une endométriose profonde (âge moyen 31 ± 6 ans) ont été explorées par EE et opérées. Concernant l'infiltration rectosigmoïdienne, des comparaisons rétrospectives ont été faites entre les signes cliniques, échographiques et les constatations opératoires. L'impact de l'EE sur le choix de la méthode de résection par laparotomie ou coelioscopie a été également évalué.

Résultats: En fonction des constatations échoendoscopiques, les malades se répartissaient en 9 cas ayant une anatomie normale, 12 ayant des images d'endométriose pelvienne sans atteinte des parois rectosigmoïdiennes, et 25 autres avec une infiltration digestive caractérisée. Ces anomalies anatomiques ont été confirmées par les constatations opératoires (22 malades laparotomisés et 25 traitées par coelioscopie), et par le suivi clinique. L'infiltration rectale démontrée par l'EUS dans tous les cas, avait été suspectée cliniquement chez 62% des patients, et dans 50%, 33%, 67% et 66% des cas par les autres examens: rectoscopie, lavement baryté, scanner et imagerie par résonance magnétique.

Conclusions: L'EE est une méthode simple et non invasive pour déceler une infiltration rectale dans l'endométriose profonde. Elle peut guider le choix entre une coelioscopie ou une laparotomie lorsqu'une résection est décidée.