

# Does Bowel Preparation Improve the Performance of Rectal Water Contrast Transvaginal Ultrasonography in Diagnosing Rectosigmoid Endometriosis?

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## Abbreviations

BP, bowel preparation; CI, confidence interval; DIE, deep infiltrating endometriosis; LOA, limits of agreement; RWC-TVS, rectal water transvaginal ultrasonography; SD, standard deviation

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**Objectives**—The primary objective of the study was to compare the performance of the rectal water transvaginal ultrasonography (RWC-TVS) with and without bowel preparation (BP) in diagnosing rectosigmoid endometriosis. The secondary objectives were to compare the performance of the 2 exams in estimating infiltration of the mucosa, length of the largest rectosigmoid nodules, distance of the nodules from the anal verge, and presence of multifocal disease.

**Methods**—This prospective study included patients with pain symptoms and intestinal complaints suggestive of endometriosis. Patients underwent RWC-TVS with and without BP within an interval of 1 week to 2 months. Two independent and blinded gynecologists performed the exams. The results of the 2 exams were compared with surgical and histologic findings.

**Results**—A total of 155 patients were included in the study; 92 patients had rectosigmoid endometriosis. There was no significant difference in the performance of RWC-TVS with or without BP in diagnosing rectosigmoid endometriosis ( $P = .727$ ). There was no significant difference in the performance of RWC-TVS with or without BP in diagnosing infiltration of the mucosa ( $P = .424$ ) and multifocal disease ( $P = .688$ ), in estimating the main diameter of the largest nodule ( $P = .644$ ) and the distance between the more distal rectosigmoid nodule and the anal verge ( $P = .090$ ). The patients similarly tolerated the 2 exams ( $P = .799$ ).

**Conclusions**—Bowel preparation does not improve the performance of RWC-TVS in diagnosing rectosigmoid endometriosis and in assessing the characteristics of these nodules.

**Key Words**—bowel endometriosis; bowel preparation; endometriosis; ultrasonography

Endometriosis is a chronic estrogen-dependent gynecologic disease causing pain symptoms and infertility. It affects at least 3.6% of reproductive-age women.<sup>1</sup> Deep infiltrating endometriosis (DIE) is one of the most severe forms of endometriosis, and it may affect the rectovaginal septum, the uterosacral ligaments, bowel, bladder, peritoneum, and other abdominal organs.

It is well established that transvaginal ultrasonography is the first-line investigation in patients with suspicion of DIE, and recently the International Deep Endometriosis Analysis group described a systematic approach to the examination of patients with suspicion of DIE.<sup>2</sup> One of the most relevant diagnoses in patients with DIE is the infiltration of the rectosigmoid. In fact, knowing preoperatively the presence of intestinal endometriosis allows the gynecologist to provide an adequate consent to the patients and to schedule surgery with the assistance of a colorectal surgeon.<sup>3</sup>

Improvement in the performance of transvaginal ultrasonography in diagnosing rectosigmoid endometriosis may be obtained by rectal water contrast transvaginal ultrasonography (RWC-TVS). This technique is based on the concept of distending the rectosigmoid colon by using saline solution while performing ultrasonography.<sup>4-9</sup> A recent Cochrane review found that RWC-TVS has high diagnostic accuracy in detecting rectosigmoid endometriosis, although this observation should be interpreted with caution because of the low quality of most of the included studies.<sup>10</sup>

All previous studies investigating the diagnostic performance of RWC-TVS used a bowel preparation (BP) before the exam. In some studies, patients were asked to drink a granular powder dissolved in water on the day before the exam<sup>5</sup>; in other studies, BP consisted of a rectal enema performed a few hours before the ultrasonography.<sup>4,6-8</sup> However, the usefulness of BP before RWC-TVS remains to be established.

This prospective study compared the diagnostic performance of RWC-TVS performed with and without BP.

## Methods

### **Objectives of the Study**

The primary objective of the study was to compare the performance of the RWC-TVS with and without BP in diagnosing the presence of rectosigmoid endometriosis. The secondary objectives of the study were to assess the accuracy of the 2 techniques in diagnosing the presence of infiltration of the intestinal mucosa and to compare the precision of the 2 techniques in estimating the length of the rectosigmoid

nodules, their distance from the anal verge, and the presence of multifocal disease.

The study protocol was approved by the local Ethics Committee (430REG2016). Subjects of the study signed a written consent form.

### **Study Population**

This prospective study included women of reproductive age who were referred to our institution and had the following characteristics: pain symptoms and intestinal complaints suggestive of endometriosis, and suspicion of DIE at vaginal and rectal examinations. Exclusion criteria for the study were previous surgical or radiological diagnosis of bowel endometriosis, previous hysterectomy, previous bilateral ovariectomy, virgin patients, or patients in whom TVS could not be performed.

### **Study Design**

Patients who participated in the study underwent 2 RWC-TVSs that were performed by 2 gynecologists with extensive experience in the diagnosis of DIE (over 500 transvaginal sonograms for DIE). The gynecologists were informed of the patients' clinical history and symptoms, but they were blinded to the results of vaginal and rectal examination. Furthermore, 1 gynecologist performed RWC-TVS without BP, and the other performed RWC-TVS with BP; the examinations were independently and blindly performed by each gynecologist. The 2 RWC-TVSs were performed within an interval of 1 week to 2 months. Subjects of the study underwent laparoscopy within 6 months from the second RWC-TVS.

The following BP was used for the purpose of the study: a low-residue diet in the 2 days before the examination and a rectal enema (120 mL of sodium diphosphate) administered a few hours before the exam.

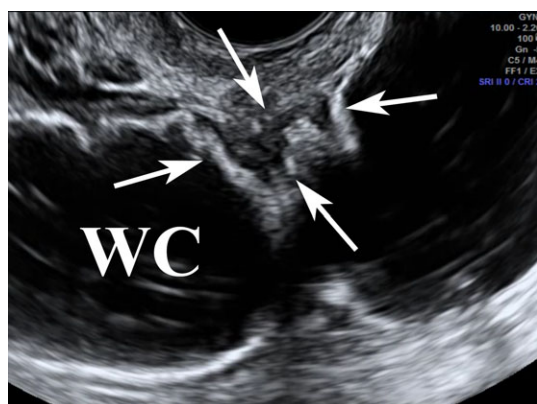
### **Assessment of Symptoms**

A standardized assessment of pain and intestinal symptoms was performed at the time of inclusion in the study. The prevalence of pain symptoms (dysmenorrhea, deep dyspareunia, chronic pelvic pain) and intestinal complaints was investigated. The intensity of pain symptoms was assessed using a 100 mm visual analog scale. Intestinal symptoms were evaluated using the Gastrointestinal Quality of Life Index.<sup>11</sup>

### Rectal Water Transvaginal Ultrasonography Technique

The RWC-TVS technique was previously described in detail.<sup>4–7,9,12</sup> In this study, only 2-dimensional images obtained after rectal distention were examined. No assessment of rectosigmoid endometriosis with standard TVS was performed. A flexible catheter was introduced through the anal os into the rectal lumen up to 15 cm from the anus. A gel was used to minimize the discomfort caused by the passage of the catheter. After the connection of a 50-mL syringe to the catheter, up to 300 mL of sterile saline solution was injected into the rectosigmoid under sonographic guidance. Rectal water transvaginal ultrasonography was performed by using a Voluson E6 or a Voluson S8 machine (GE Healthcare, Milwaukee, WI). The rectosigmoid nodules appear as a thickening of the hypoechoic muscular layer or as hypoechoic nodules, with or without hyperechoic foci with blurred margins (Figures 1–3).<sup>2,5,9,13,14</sup> The midsagittal diameter of the intestinal nodule was measured to estimate the size of the nodule. Rectal water transvaginal ultrasonography enhances the visualization of the various layers of the bowel wall<sup>7</sup>; the muscularis mucosa is hypoechoic, and the interface between the lumen and the mucosal layer is hyperechoic. The infiltration of the intestinal mucosa was assessed (Figure 4). The location of the nodules was classified as suggested by the International Deep Endometriosis Analysis group consensus opinion<sup>2</sup>: lower anterior rectal nodules

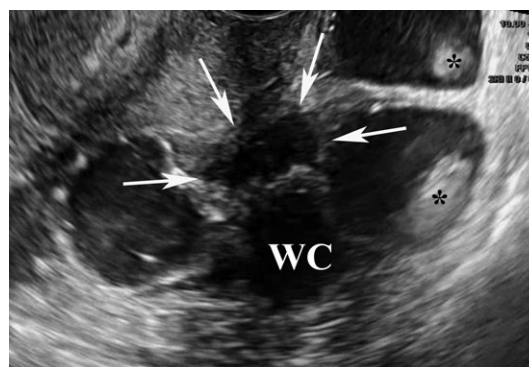
**Figure 1.** RWC-TVS with BP shows a rectal endometriotic nodule infiltrating the muscularis mucosa. The water contrast (WC) enhances the visualization of the nodule. The BP is optimal; no feces can be observed in the rectal lumen.



(located below the level of the insertion of the uterosacral ligaments on the cervix and thus retroperitoneal), upper anterior rectal nodules (located above the insertion of the uterosacral ligaments on the cervix and thus visible at laparoscopy), nodules of the rectosigmoid junction (located at the level of the uterine fundus), and anterior sigmoid nodules (located above the level of the uterine fundus). The distance between the lower margin of the more distal nodule and the anal verge was measured. The presence of multifocal disease (defined as additional nodules that affected the rectosigmoid) was investigated. The results of RWC-TVS with and without BP were compared with surgical and histologic findings.

Immediately after each examination, patients were asked to rate the discomfort encountered during

**Figure 2.** RWC-TVS without BP shows a rectal endometriotic nodule infiltrating the muscularis mucosa. Feces (asterisk) can be observed within the rectal lumen distended by the water contrast (WC).



**Figure 3.** RWC-TVS without BP shows a normal rectosigmoid. Feces (asterisk) can be observed within the rectal lumen distended by the water contrast (WC).



RWC-TVS with and without BP by using a 10-cm visual analog scale; the left extreme represented the absence of pain, and the right extreme represented the worst possible pain.

**Surgical Procedures**

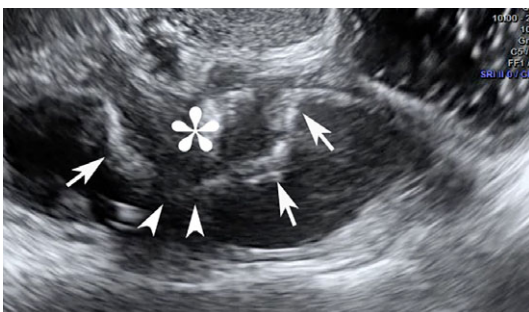
The surgeons were aware of the findings of RWC-TVS with and without BP. Furthermore, during the preoperative workup, some patients underwent other radiological examinations including multidetector computerized tomography enema,<sup>7,15-17</sup> magnetic resonance enema,<sup>6</sup> and computed tomographic colonography.<sup>4</sup> Rectosigmoid endometriotic nodules were excised by 1 of the following techniques: shaving (nodule excision without opening the rectum), discoid resection (resection of the nodule with excision of the anterior rectal wall), or segmental bowel resection. Bowel nodules were examined during surgery, and the choice of the surgical technique was based on nodule size, depth of infiltration of the nodule in the bowel wall, and presence of multifocal lesions. Shaving was performed in case of superficial involvement of the rectosigmoid by peeling the nodule off the bowel wall without opening the intestinal lumen. Discoid resection was performed when, after initial shaving, the damage to the muscularis was judged to be too deep and/or wide and the nodule was confined to the anterior wall of the bowel. Segmental resection was performed in case of large nodules (diameter > 2.5 cm) and multifocal disease (Figure 5A). During surgery, the distance between

the more distal rectosigmoid nodule from the anal verge was estimated by introducing a cannula in the bowel.

**Pathologic Evaluation of Surgical Specimens**

Bowel specimens were sent unfixed to a pathologist (V.G.V.) and were evaluated in a standardized fashion (Figure 5B). The specimens were fixed in 10% buffered formalin for 12 to 18 hours, embedded in paraffin blocks and cut with a rotative microtome to obtain 3- $\mu$ m-thick histologic slides that were stained with hematoxylin and eosin. Endometriosis was identified by the presence of endometrial-like epithelium and stroma. The depth of infiltration of endometriosis in the intestinal wall was assessed. The maximal length of the largest endometriotic nodule was measured in millimeters by eyepiece.

**Figure 4.** RWC-TVS showing a hypoechoic nodule (asterisk) infiltrating the muscularis propria of the rectum. The muscularis mucosa is hypoechoic and the interface between the lumen and the mucosal layer is hyperechoic. The healthy mucosa (arrows) and the infiltration of the mucosa by the nodule (arrowheads) can be observed.



**Figure 5.** A, RWC-TVS shows a rectal nodule (arrow) infiltrating the muscularis propria that causes a severe stenosis of the bowel lumen. A small quantity of water contrast (WC) passes beyond the stenosis where some feces (\*) can be observed. B, The nodule shown in Figure 5A was treated by segmental colorectal resection. The image shows the surgical specimen; the nodule is shown by the arrow.

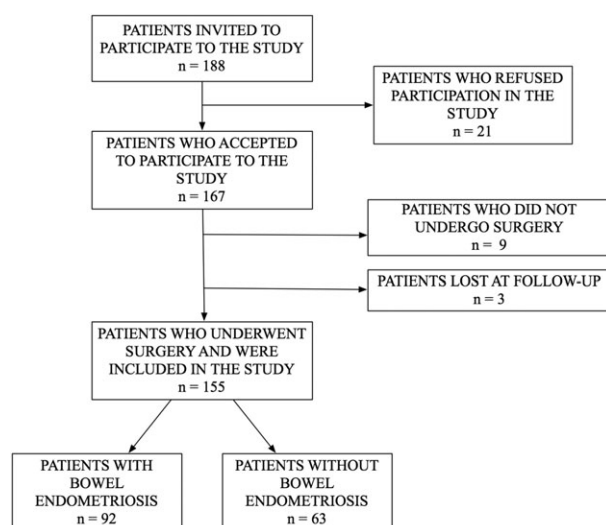




### Statistical Analysis

Accuracy, sensitivity, specificity, positive predictive value, negative predictive value, positive likelihood ratio, and negative likelihood ratio were calculated for RWC-TVS with and without BP and presented with 95% confidence intervals (CIs). The McNemar test with Yates continuity correction was used to compare the performance of RWC-TVS with and without BP in the diagnosis of rectosigmoid endometriosis. The mean differences of the measurements of nodule size and distance from the anal verge were estimated by subtracting the measurements performed by RWC-TVS with and without BP from the measurements obtained on histopathology (for nodule size) and during surgery (for distance from the anal verge). Data were presented as mean and standard deviation (SD); limits of agreement (LOA) were calculated as mean difference  $\pm$  2 SD of the difference. The normal distribution of continuous data was assessed by the Kolmogorov-Smirnov normality test. Student's *t* test was used to compare normally distributed continuous variables, while the Mann-Whitney *U* test was used to compare abnormally distributed data. Categorical variables were assessed by the chi-squared test and the Fisher's exact test, as appropriate. SPSS software version 20.0 (IBM Corporation, Armonk, NY) was used for statistical analysis. A *P* value less than .05 was considered statistically significant.

**Figure 6.** Flow diagram of selection of study population.



### Results

#### Study Population

Figure 6 shows the selection of the study population. A total of 155 patients were included in the study; 92 patients (59.4%; 95% CI, 51.2%–67.2%) had rectosigmoid endometriosis at surgery. The characteristics of the study population are shown in Table 1. The mean ( $\pm$  SD) time lapse between the 2 exams was  $4.4 \pm 2.1$  weeks; the mean ( $\pm$  SD) time lapse between RWC-TVS with BP and surgery was  $15.6 \pm 5.1$  weeks. Patients with rectosigmoid endometriosis underwent bowel resection in 56 cases, discoid resection in 27 cases, and shaving in 9 cases. The largest nodule was located on the sigmoid in 22 patients, on the rectosigmoid in 23 patients, on the upper rectum in 26 patients, and on the lower rectum in 21 patients.

#### Diagnostic Performance of RWC-TVS With and Without BP in Diagnosing Rectosigmoid Endometriosis

There was no significant difference in the performance of RWC-TVS with and without BP in diagnosing the presence of rectosigmoid endometriosis (McNemar test,  $P = .727$ ; Table 2). At histology, of 92 patients with rectosigmoid endometriosis, 32 patients (34.8%; 95% CI, 25.1%–45.4%) had infiltration of the intestinal mucosa. Both RWC-TVS with and without BP correctly diagnosed the presence of rectosigmoid nodules in 80 patients. There was no statistically significant difference in the performance of RWC-TVS with or without BP in diagnosing mucosal infiltration in patients with ultrasonographically diagnosed rectosigmoid endometriosis (McNemar test,  $P = .424$ ; Table 3). At histology, 18 patients (19.6%; 95% CI, 12.0%–29.1%) had multifocal disease. There was no significant difference in the accuracy of RWC-TVS with or without BP in diagnosing multifocal disease in patients with ultrasonographically diagnosed rectosigmoid endometriosis (McNemar test,  $P = .688$ ; Table 4). The mean ( $\pm$  2 SD) main diameter of the largest nodule at histology was  $28.1 \pm 6.2$  mm. The mean difference between the size of the largest nodule estimated by RWC-TVS and histopathology was  $1.9 \pm 1.1$  mm (95% CI, 1.6–2.1 mm; LOA,  $-0.3$  to 3.0) for RWC-TVS without BP and  $1.6 \pm 1.2$  (95% CI, 1.3–1.9 mm; LOA,  $-0.9$  to 4.1) for RWC-TVS with BP ( $P = .644$ ). At surgery, the mean ( $\pm$  SD) distance between the more distal rectosigmoid nodule and the

anal verge was  $16.0 \pm 5.4$  mm. The mean difference in the distance between the more distal nodule and the anal verge estimated by RWC-TVS was  $2.9 \pm 1.7$  cm (95% CI, 2.5–3.3 cm; LOA, –0.5 to 6.3) for RWC-TVS without BP and  $2.6 \pm 2.1$  cm (95% CI, 2.1–3.1 cm; LOA, –1.6 to 6.8) for RWC-TVS with BP ( $P = .090$ ).

**Tolerability of Rectal Water Transvaginal Ultrasonography with and without Bowel Preparation**

No patient required interrupting RWC-TVS with or without BP because of pain. The mean ( $\pm$  SD)

intensity of pain reported by the patients was similar during RWC-TVS with and without BP ( $3.5 \pm 1.2$  and  $3.4 \pm 1.2$ , respectively;  $P = .799$ ).

**Discussion**

It is well known that TVS should be the first-line investigation in patients with suspicion of deep endometriosis.<sup>2,18,19</sup> Rectal water transvaginal ultrasonography may facilitate the identification of rectosigmoid

**Table 1.** Demographic Characteristics of the Study Population

	Patients With Rectosigmoid Endometriosis (n = 92)	Patients Without Rectosigmoid Endometriosis (n = 63)	P Value
Age, y (mean $\pm$ SD)	32.5 $\pm$ 4.2	32.6 $\pm$ 4.7	.861
Body mass index (kg/m <sup>2</sup> ; mean $\pm$ SD)	23.5 $\pm$ 2.2	23.8 $\pm$ 2.4	.463
Previous live births (n, %)	16 (17.4%)	12 (19.0%)	.792
Hormonal therapies at the time of the study (n, %)	66 (71.7%)	44 (69.8%)	.966
Combined contraceptives			
Sequential oral contraceptive	10 (10.9%)	8 (12.7%)	.727
Continuous oral contraceptive pill	14 (15.2%)	9 (14.3%)	.873
Extended regimen oral contraceptive	4 (4.3%)	3 (4.8%)	.903
Vaginal ring	7 (7.6%)	6 (9.5%)	.673
Transdermal patch	2 (2.2%)	2 (3.2%)	.700
Progestins			
Desogestrel	5 (5.4%)	2 (3.2%)	.506
Dienogest	8 (8.7%)	4 (6.3%)	.591
Norethindrone acetate	9 (9.8%)	5 (7.9%)	.694
Etonogestrel subdermal implant	1 (1.1%)	2 (3.2%)	.354
Levonorgestrel-releasing intrauterine device	4 (4.3%)	2 (3.2%)	.710
Gonadotropin releasing hormone analogs	2 (2.2%)	1 (1.6%)	.795
Previous surgery for endometriosis, n (%)	24 (26.1%)	15 (23.8%)	.748
Pain symptoms			
Prevalence of dysmenorrhea, n (%) <sup>a</sup>	33 (91.6)	25 (92.6)	.893
Intensity of dysmenorrhea (mean $\pm$ SD) <sup>a</sup>	73.0 $\pm$ 7.2	72.1 $\pm$ 7.9	.636
Prevalence of deep dyspareunia, n (%)	69 (75.0)	46 (73.0)	.782
Intensity of deep dyspareunia (mean $\pm$ SD)	61.2 $\pm$ 11.2	59.9 $\pm$ 10.5	.539
Prevalence of nonmenstrual pelvic pain, n (%)	72 (78.2)	50 (79.4)	.869
Intensity of nonmenstrual pelvic pain (mean $\pm$ SD)	56.3 $\pm$ 8.1	57.8 $\pm$ 8.2	.304
Prevalence of digestive complaints			
Dyschezia, n (%)	51 (55.4)	30 (50.1)	.339
Constipation, n (%)	32 (34.8)	14 (22.2)	.093
Diarrhea, n (%)	28 (30.4)	15 (23.8)	.366
Intestinal cramping, n (%)	53 (57.6)	33 (52.3)	.520
Abdominal bloating, n (%)	56 (60.8)	40 (63.5)	.741
Feeling of incomplete evacuation, n (%)	33 (35.9)	17 (26.9)	.245
Passage of mucus, n (%)	29 (31.5)	11 (17.4)	.049
Rectal bleeding, n (%)	15 (16.3)	3 (4.8)	.028
Gastrointestinal Quality of Life Index score (mean $\pm$ SD)	71.5 $\pm$ 8.8	74.4 $\pm$ 7.3	.027

<sup>a</sup>Values presented as percentage and 95% confidence interval.

nodules compared with standard TVS exam because the distention of the intestinal lumen enhances the identification of the layers of the anterior rectosigmoid wall.<sup>5</sup> Several previous studies showed that RWC-TVS has high performance in diagnosing rectosigmoid endometriosis.<sup>10</sup> When considering the diagnosis of rectosigmoid endometriosis, RWC-TVS has performance similar to computed tomography enema,<sup>7</sup> magnetic resonance enema,<sup>6</sup> computed tomographic colonography,<sup>4</sup> transrectal ultrasonography,<sup>8</sup> and barium enema.<sup>8</sup> In all of these studies, BP was used before RWC-TVS<sup>4–9,12</sup>; however, there is no evidence that BP improves the diagnostic performance of this examination. Recently, a prospective study compared the accuracy of TVS with and without BP in diagnosing intestinal endometriotic nodules.<sup>20</sup> Although this study was limited by the small sample size (40 patients), it showed that BP improves the diagnostic performance of standard TVS exam. In contrast with these findings, the current study shows that BP does not improve the performance of RWC-TVS in diagnosing the presence of rectosigmoid endometriosis and in establishing the characteristics of these nodules (largest diameter of the main nodule, presence of multifocal disease, and distance from the anal verge).

The findings of this study have clinical implications. When intestinal endometriosis is suspected,

patients may immediately undergo RWC-TVS if the gynecologist has expertise in performing ultrasonography for DIE without the need to postpone the examination because of BP. In addition, patients may avoid the discomfort caused by BP, which may be more

**Table 2.** Diagnostic Performance of Rectal Water Transvaginal Ultrasonography With and Without Bowel Preparation in Diagnosing Rectosigmoid Endometriosis

	Rectal Water Transvaginal Ultrasonography Without Bowel Preparation	Rectal Water Transvaginal Ultrasonography With Bowel Preparation
Accuracy <sup>a</sup>	89.0% (83.0%–93.5%)	90.3% (84.5%–94.5%)
Sensitivity <sup>a</sup>	88.0% (79.6%–93.9%)	91.3% (83.6%–91.2%)
Specificity <sup>a</sup>	90.5% (80.4%–96.4%)	88.9% (78.4%–95.4%)
Positive predictive value <sup>a</sup>	93.1% (86.3%–96.7%)	92.3% (85.6%–96.0%)
Negative predictive value <sup>a</sup>	83.8% (74.7%–90.1%)	87.5% (78.2%–93.2%)
Positive likelihood ratio <sup>b</sup>	9.24 (4.30–19.86)	8.22 (4.08–16.57)
Negative likelihood ratio <sup>b</sup>	0.13 (0.08–0.23)	0.10 (0.05–0.19)

<sup>a</sup>Values presented as percentage and 95% confidence interval.

<sup>b</sup>Values presented as ratio and 95% confidence interval.

**Table 3.** Performance of Rectal Water Transvaginal Ultrasonography With and Without Bowel Preparation in Diagnosing Mucosal Infiltration in Patients With Ultrasonographically Diagnosed Rectosigmoid Endometriosis

	Rectal Water Transvaginal Ultrasonography Without Bowel Preparation	Rectal Water Transvaginal Ultrasonography With Bowel Preparation
Accuracy <sup>a</sup>	88.9% (80.0%–94.8%)	92.9% (85.1%–97.3%)
Sensitivity <sup>a</sup>	89.3% (71.8%–97.7%)	86.7% (69.3%–96.2%)
Specificity <sup>a</sup>	88.7% (77.0%–95.7%)	96.3% (87.3%–99.6%)
Positive predictive value <sup>a</sup>	80.7% (66.0%–90.0%)	92.9% (76.8%–98.1%)
Negative predictive value <sup>a</sup>	94.0% (84.3%–97.9%)	92.9% (83.9%–97.1%)
Positive likelihood ratio <sup>b</sup>	7.89 (3.67–16.94)	23.40 (5.96–91.83)
Negative likelihood ratio <sup>b</sup>	0.12 (0.04–0.35)	0.14 (0.06–0.35)

<sup>a</sup>Values presented as percentage and 95% confidence interval.

<sup>b</sup>Values presented as ratio and 95% confidence interval.

**Table 4.** Performance of Rectal Water Transvaginal Ultrasonography With and Without Bowel Preparation in Diagnosing Multifocal Disease in Patients With Ultrasonographically Diagnosed Rectosigmoid Endometriosis

	Rectal Water Transvaginal Ultrasonography Without Bowel Preparation	Rectal Water Transvaginal Ultrasonography With Bowel Preparation
Accuracy <sup>a</sup>	95.1% (87.8%–98.6%)	97.6% (91.7%–99.7%)
Sensitivity <sup>a</sup>	75.0% (47.6%–92.7%)	87.5% (61.7%–98.5%)
Specificity <sup>a</sup>	100% (94.5%–100.0%)	100% (94.7%–100.0%)
Positive predictive value <sup>a</sup>	100.0%	100.0%
Negative predictive value <sup>a</sup>	94.2% (87.4%–97.4%)	97.1% (90.3%–99.2%)
Positive likelihood ratio <sup>b</sup>	— <sup>c</sup>	— <sup>c</sup>
Negative likelihood ratio <sup>b</sup>	0.25 (0.11–0.58)	0.12 (0.03–0.46)

<sup>a</sup>Values presented as percentage and 95% confidence interval.

<sup>b</sup>Values presented as ratio and 95% confidence interval.

<sup>c</sup>Positive likelihood ratio could not be calculated because of the absence of false-positive.

severe in women who already have intestinal complaints. Finally, the cost of BP can be saved.

We are aware that this study has some limitations. The gynecologists performing RWC-TVS in the current study have extensive experience in the ultrasonographic diagnosis of DIE. It is possible that if RWC-TVS is performed by less experienced operators, BP has a different impact on the diagnostic performance of this exam. Another limitation of this study is that it aimed only to evaluate the presence and characteristics of rectosigmoid endometriosis, while other DIE lesions were not evaluated. Although RWC-TVS mainly aims to evaluate the rectosigmoid, it remains to be established if BP has a role in the assessment of other endometriotic nodules (such as vaginal nodules, rectovaginal nodules, and nodules of the uterosacral ligaments). A theoretical limitation of this study is that the surgeons were aware of the findings of RWC-TVS with and without BP; however, it seems unlikely that this may have influenced the surgical findings.

The major strengths of this study are the prospective design and the large sample size (155 patients, 92 with rectosigmoid endometriosis). Furthermore, 2 independent and blinded gynecologists performed RWC-TVS with and without BP. Finally, all of the study patients used a standardized BP (3-day low-residue diet and rectal enema).

In conclusion, this prospective study shows that adding BP to RWC-TVS does not increase the performance of this examination in diagnosing rectosigmoid endometriosis and in assessing the characteristics of these nodules.

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