Multidetector computerized tomography enema versus magnetic resonance enema in the diagnosis of rectosigmoid endometriosis

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A B S T R A C T

Purpose: To compare the accuracy of multidetector computerized tomography enema (MDCT-e) and magnetic resonance enema (MRI-e) in determining the presence of sigmoid and rectal endometriotic nodules.

Materials and methods: 260 women (32.6±4.3 years) with symptoms suggestive of rectosigmoid endometriosis underwent MDCT-e and MRI-e prior to laparoscopy. After retrograde colonic distention and injection of intravenous contrast medium, patients were scanned on a 64-row MDCT scanner. MRI-e was performed on a 1.5 T magnet using an 8 channels phased array coil; intestinal distention was achieved by introducing in the rectum 250–300 ml of ultrasonographic gel diluted with saline solution. Radiological findings were compared with surgical and histological results.

Results: 176 women had rectosigmoid endometriosis at surgery. There was no significant difference in the accuracy of MDCT-e (98.5%) and MRI-e (96.9%) in the diagnosis of sigmoid and rectal endometriosis (p = 0.248). The sensitivity, specificity, positive predictive value, negative predictive value, positive likelihood ratio and negative likelihood ratio of MDCT-e and MRI-e were respectively 98.3%, 98.8%, 99.4%, 96.5%, 81.59, 0.02 and 97.2%, 96.4%, 98.3%, 94.1%, 26.89, 0.03.

Conclusions: Both MDCT-e and MRI-e are accurate in the diagnosis of rectal and sigmoid endometriosis.

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1. Introduction

Over the last ten years several radiological techniques have been proposed for the diagnosis of bowel endometriosis including transvaginal ultrasonography [1], rectal water contrast transvaginal ultrasonography [2], rectal endoscopic ultrasonography [3], double-contrast barium enema [4], and magnetic resonance (MR) imaging [3–5]; the latter is the preferred method to evaluate deep endometriosis.

Multidetector computerized tomography enteroclysis was previously shown to be effective in the diagnosis of bowel endometriosis [6–8]. A prospective study including 98 women demonstrated that multidetector computerized tomography enteroclysis has a sensitivity of 98.7%, a specificity of 100%, a positive predictive value (PPV) of 100% and a negative predictive value (NPV) of 95.7% in identifying patients with bowel endometriosis [6]. Multidetector computerized tomography enteroclysis allows to accurately estimate the presence of infiltration of endometriosis in the muscularis propria of the whole colon [6,7]. In addition, multidetector computerized tomography enteroclysis urography allows the radiologists to assess whether ureteral compression is present without increasing the radiation dose imparted to the patients [8]. When compared with other techniques, in particular transvaginal ultrasonography or MR, multidetector computerized tomography enteroclysis has some limitations including the administration of a radiation dose to young women in the childbearing age and the use of the iodinated contrast medium, which is required to well recognize endometriotic lesions during volumetric acquisition.

Intestinal distention during multidetector computerized tomography enteroclysis highlights the endometriotic nodules infiltrating the bowel wall because it overcomes the limits of the empty loops that hamper the detection of wall lesions. In fact, during intestinal distention, bowel lesions are detectable, the tissue...
around the intestine is visible, the density difference between the lumen (hypodense) and the parietal nodule (hyperdense solid lesion) improves nodule detectability. In the current study, the concept of retrograde intestinal distention was applied to MR because deep endometriotic lesions may have signal intensity very close to that of the surrounding fibromuscular structures [9].

This prospective study compared the accuracy of multidetector computerized tomography enema (MDCT-e) and magnetic resonance enema (MRI-e) in determining the presence of rectal and sigmoid endometriotic nodules.

2. Materials and methods

2.1. Study population

Subjects of the study were recruited among patients referred to our endometriosis center. Inclusion criteria for the study were: reproductive age, suspicion of deep pelvic endometriosis on the basis of gynecological symptoms and vaginal examination, presence of gastrointestinal symptoms that might be caused by rectosigmoid endometriosis. The following exclusion criteria were used in the study: previous bilateral ovariectomy, previous radiological exams of the bowel requiring contrast media, previous bowel surgery (except appendectomy), previous episodes suggestive of intolerance to iodinated contrast media, renal or hepatic failure, presence of absolute contraindications to MR examination, psychiatric disorders.

Two hundred and sixty women were included in the study. The mean (±SD) age of the patients included in the study was 32.6 ± 4.3 years. One hundred and thirteen patients (43.5%) underwent previous surgery for endometriosis. At the time of the study, 162 women (62.3%) did not use any hormonal therapy, 53 women (20.4%) used sequential oral contraceptive, 12 women (4.6%) used continuous oral contraceptive, 19 women (7.3%) used norethisterone acetate and 14 women (5.4%) were treated with sequential contraceptive vaginal ring.

Symptoms were systematically investigated (Table 1). The presence of dysmenorrhoea, deep dyspareunia, chronic pelvic pain, and dyschezia was assessed; the intensity of these symptoms was rated on a 10 cm visual analogue scale (VAS), the left extreme of the scale representing the absence of pain and the right extreme of the scale indicating the maximal intensity of pain. The presence of the following gastrointestinal symptoms was assessed: diarrhoea (more than three bowel movements per day), constipation during the menstrual cycle, abdominal bloating, intestinal cramping, feeling of incomplete evacuation after bowel movements. A symptom analogue scale questionaire was used to estimate the severity of each gastrointestinal symptom (1 indicated the absence of the symptom; 10 indicated the highest severity of the symptom).

MDCT-e and MRI-e were performed within two days. MDCT-e was performed on the first day after the bowel preparation typically used for this technique. MRI-e was carried out on the following day asking the patients to have a prevalent liquid diet between the two exams. All patients underwent laparoscopy within one month from the radiological investigations independently from the radiological findings. The surgeon was aware of presence/absence of intestinal endometriosis in the radiological examinations; this was required to manage the informed consent and to plan the surgical procedure with the general surgeon.

Bowel endometriosis was defined as endometriotic lesions infiltrating at least the muscularis propria of the intestinal wall. Findings of MDCT-e and MRI-e were compared with surgical and histological results. The presence of right colon endometriotic involvement, if present and detected at MDCT-e, was recorded. The local ethics committee approved the study. All patients accepting to participate to the study signed a written consent form.

<table>
<thead>
<tr>
<th>Table 1 Characteristic of symptoms of the study population (n = 260).</th>
</tr>
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<tbody>
<tr>
<td>Symptoms (number of patients, %, mean intensity ± SD)</td>
</tr>
<tr>
<td>- Dysmenorrhoea a</td>
</tr>
<tr>
<td>- Deep dyspareunia b</td>
</tr>
<tr>
<td>- Chronic pelvic pain</td>
</tr>
<tr>
<td>- Dyschezia</td>
</tr>
<tr>
<td>- Infertility</td>
</tr>
<tr>
<td>- Persistent constipation</td>
</tr>
<tr>
<td>- Constipation during the menstrual cycle a</td>
</tr>
<tr>
<td>- Persistent diarrhea</td>
</tr>
<tr>
<td>- Diarrhea during the menstrual cycle a</td>
</tr>
<tr>
<td>- Intestinal cramping</td>
</tr>
<tr>
<td>- Abdominal bloating</td>
</tr>
<tr>
<td>- Cyclical rectal bleeding</td>
</tr>
<tr>
<td>- Mucus in the stools</td>
</tr>
<tr>
<td>- Incomplete evacuation</td>
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</tbody>
</table>

a Determined for the 209 menstruating women who were not using continuous hormonal therapies.

b Determined for the 232 sexually active women included in the study.

2.2. Multidetector computerized tomography enema technique

Bowel preparation was obtained asking the patients to use a low-residue diet for three days before the exam. In addition, a laxative isosmolar nonabsorbable solution (Isocolan, Bracco, Milan, Italy) was administered orally (variable doses proportionally to the patients’ weight) on the day before the exam. Retrograde colonic distention was performed on the CT bed introducing about 2000–2200 ml of water (37 °C). During the enema, pharmacological inhibition of peristaltic waves was obtained by intravenous injection of hyoscine butylbromide (Buscopan; Boehringer Ingelheim, Florence, Italy). Patients were scanned on a 64 row MDCT scanner (LightSpeed VCT, GE Medical Systems, Waukesha, WI, USA). The scan parameters were: 64 × 0.625 mm collimation, rotation time 0.5 s, tube voltage 120 kV, effective mA 340. The patients were scanned in supine position, with a volumetric acquisition from the dome of the diaphragm to the pubic symphysis, performed in portal phase (40 s after the arterial peak) after the injection of the intravenous contrast medium (iopamidol 370 mg I/ml; Iopamiro, Bracco, Milan, Italy). The injection of the contrast medium was performed accordingly to the ‘double split’ bolus technique [8]: a pre-bolus of iodinated contrast medium (20% of the total dose evaluated proportionally to the body weight) was injected simultaneously to the colon distention; the remaining dose was injected and the CT scan performed in the portal phase. The rate of the injection was set at 3.0 ml/s with an automatic power injector. Bolus-tracking software (Smart-Prep, GE Medical Systems, Waukesha, WI, USA) was used to maximize the quality of MDCT images. The estimated radiation exposure during this scan protocol was evaluated by the CTD index, automatically calculated by the scanner, and it was between 12 and 14 mGy in all cases. Images were evaluated with multiplanar reconstructions, performed in all cases.

The MDCT-e criterion to diagnose bowel endometriosis was the presence of solid nodules, contiguous or penetrating the thickened colonic wall. Infiltration of the muscularis propria was diagnosed when the fat plane between the nodule and the bowel disappears.
and the nodule penetrates the intestinal wall from outside, licks the inner surface and bulges toward the mucosa [6,7]. A pathological multilayered aspect of the wall may be detectable.

2.3. Magnetic resonance enema technique

MRI-e was performed on a 1.5 T magnet (Signa Excite HDx, GE Medical Systems, Waukesha, WI, USA) using an 8 channels phased array coil. In all cases, the pelvic volume was evaluated. All studies followed an established examination protocol, consisting of: T2W FrFSE axial images (FOV = 30–36 cm; TE = 150 ms; TR = 5500 ms; matrix, 320 × 224; slice thickness = 3 mm; spacing = 1; acceleration factor = 1; 4 NEX); T2W FrFSE fat sat coronal images (FOV = 31–33 cm; TE = 150 ms; TR = 4250 ms; matrix, 384 × 254; slice thickness = 4 mm; spacing = 1; acceleration factor = 1; 4 NEX); T1W FSE coronal images (FOV = 31–33 cm; TE = min full; TR = 550 ms; matrix, 320 × 224; slice thickness = 3 mm; spacing = 1; matrix, 256 × 256; 2 NEX), T2W FrSE sagittal images (FOV = 31–33 cm; TE = 150 ms; TR = 4250 ms; matrix, 384 × 256; slice thickness = 3 mm; spacing = 1; acceleration factor = 1; 6 NEX), T2W FrFSE fat sat sagittal images (FOV = 31–33 cm; TE = 120 ms; TR = 4600 ms; matrix, 384 × 256; slice thickness = 4 mm; spacing = 1; acceleration factor = 1; 4 NEX), diffusion weighted EPI (b = 800) axial images (FOV = 30–36 cm; TR = 3000 ms; matrix, 128 × 128; slice thickness = 4 mm; spacing = 1; 8 NEX). T1W images were acquired, employing fat-suppression even after contrast enhancement (gadobutrol at a dosage of 0.2 mmol/kg body-weight; Gadovist 1.0, Schering, Berlin, Germany).

After the patient lied on the MR bed, the retrograde distention was performed initially on the left lateral decubitus, then on the prone position to reduce abdominal wall movements and respiratory artifacts. 300–400 ml of ultrasonographic gel (Aquasonic, Parker Laboratories, Fairfield, NJ, USA) diluted with saline solution (1:8) were introduced to distend the rectum and the sigmoid colon by using a syringe connected to a 20-Fr Foley catheter. Intestinal hypotonization was not used in MR imaging because of the limited quantity of intraluminal contrast medium (in comparison with MDCT-e colonic distention). The examination position of the patient was preferably prone and the MR entry position in the gantry was feet first.

Endometriotic nodules are detectable as solid mass outside the sigmoid or rectal wall, frequently with a hypointense signal due to their fibrous nature [9,10]. Visible penetration of the nodule in the intestinal wall was the main parameter to hypothesize the infiltration of the muscularis propria.

2.4. Tolerability of the radiological exams

Immediately after MDCT-e and MRI-e, patients were asked to rate the pain encountered during each exam by using a 10 cm visual analogue scale (VAS); the left extreme represented the absence of pain, and the right extreme represented the worst possible pain. Mild pain was defined as VAS score <2, moderate pain as VAS score ≥2 and ≤ 5, and severe pain as VAS score >5.

2.5. Evaluation of MDCT-e and MRI-e images

Two radiologists blindly reviewed the images at a PACS (Picture Archiving and Communication System) workstation. They were not aware of clinical findings and patients’ history, knowing only that the presence of bowel endometriosis was clinically suspected. If there was a disagreement in the judgment of one exam, the two observers evaluated the exam in a joined session. In each exam, the following data were assessed: presence and location of rectosigmoid endometriotic nodules, size of the larger endometriotic nodule (Fig. 1).

2.6. Surgical technique

Before laparoscopy, the surgeons examined the reports and the images of both MDCT-e and MRI-e. All the surgical procedures were performed laparoscopically by a team of gynecological and colorectal surgeons with extensive experience in the treatment of pelvic and rectosigmoid endometriosis. After adequate adhesiolysis, the sigmoid colon and the rectum were systematically examined to verify the presence of endometriotic lesions. All visible endometriotic lesions (except those on the diaphragm) were excised. Rectosigmoid endometriotic lesions infiltrating at least the muscularis propria were removed by segmental bowel resection. The specimens excised at surgery were histologically evaluated; the depth of infiltration of the endometriotic nodules in the bowel wall was determined [2,11].

2.7. Statistical analysis

Sensitivity, specificity, PPV and NPV were determined for both MDCT-e and MRI-e. The diagnostic value of each test was
also evaluated using positive likelihood ratio (LR+) and negative likelihood ratio (LR−). The McNemar’s test with the Yates continuity correction was used to compare the accuracy of MDCT-e and MRI-e in the diagnosis of intestinal endometriosis. The accuracy of the measurement of nodule size by imaging techniques was estimated by subtracting the size of the nodule as measured by the techniques from the size of the nodule as measured at histology. The nonparametric Mann–Whitney test was used to compare the intensity of pain experienced by the patients during MDCT-e and MRI-e. The χ² test was used to compare the type of pain (mild, moderate and severe) experienced by the patients undergoing the two exams. Data were archived using Excel 2007 (Microsoft, Redmond, WA, USA) and analyzed using Sigma Stat software version 3.5 (SPSS Science, Chicago, IL, USA). P<0.05 was considered statistically significant.

3. Results

3.1. Study population

Surgery demonstrated that 176 women (67.7%; 95% C.I., 61.6–73.3%) had rectosigmoid endometriotic nodules. The endometriotic nodules were located on the sigmoid colon in 96 cases (54.5%), on the rectosigmoid junction in 28 cases (15.9%) and on the rectum in 52 cases (29.6%). The mean (±SD) length of the resected bowel segment was 11.8 cm (±2.5 cm). Histological examination of the specimens excised at surgery confirmed the diagnosis of endometriosis in all the excised nodules; in addition, it demonstrated that the deeper endometriotic nodule infiltrated the intestinal muscularis propria in 116 patients (65.9%), the submucosa in 40 women (22.7%) and the mucosa in 20 patients (11.4%).

3.2. Accuracy of MDCT-e and MRI-e in diagnosing rectosigmoid endometriotic nodules

Out of 176 patients with histological diagnosis of rectosigmoid endometriosis, MDCT-e yielded a diagnosis of rectosigmoid endometriosis in 175 patients, while MRI-e yielded a diagnosis of rectosigmoid endometriosis in 174 patients. In MDCT-e, a rectosigmoid nodule of endometriosis was not detected in one case: a nodule reaching the muscularis propria of the rectosigmoid junction (Fig. 2). MRI-e did not identify two rectosigmoid endometriotic nodules: one nodule was the same unidentified by MDCT-e infiltrating the muscularis propria of the rectosigmoid junction and the other was deeply infiltrating the muscularis propria of the sigmoid. The accuracy, sensitivity, specificity, PPV, NPV, LR+ and LR− of MDCT-e and MRI-e in the diagnosis of recto-sigmoid endometriosis were 98.5%, 98.3%, 98.8%, 99.4%, 96.5%, 81.59, 0.02 and 96.9%, 97.2%, 96.4%, 98.3%, 94.1%, 26.89, 0.03, respectively. The two techniques had similar accuracy in the diagnosis of recto-sigmoid endometriosis (p=0.248) (Figs. 3–5). MDCT-e showed that three patients had isolated intestinal nodules on the cecum that infiltrated the muscularis; these nodules could not be identified by MRI-e and they were not considered in the statistical analysis.

<table>
<thead>
<tr>
<th>Histology</th>
<th>MDCT-e Largest diameter (mm, mean ± SD)</th>
<th>MDCT-e Mean difference (mm, 95% CI)</th>
<th>MDCT-e Limits of agreement (mm)</th>
<th>MR-e Largest diameter (mm, mean ± SD)</th>
<th>MR-e Mean difference (mm, 95% CI)</th>
<th>MR-e Limits of agreement (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All nodules</td>
<td>28.2 ± 6.4</td>
<td>1.167 (0.843–1.491)</td>
<td>−3.161 to 5.495</td>
<td>0.994 (0.628–1.360)</td>
<td>−3.894 to 5.882</td>
<td></td>
</tr>
<tr>
<td>Nodules with diameter &lt;30 mm</td>
<td>23.2 ± 3.1</td>
<td>0.374 (−0.044 to 0.792)</td>
<td>−1.822 to 4.570</td>
<td>−0.131 (−0.534 to 0.272)</td>
<td>−4.169 to 3.907</td>
<td></td>
</tr>
<tr>
<td>Nodules with diameter ≥30 mm</td>
<td>34.8 ± 2.5</td>
<td>2.213 (1.803–2.623)</td>
<td>−1.347 to 5.773</td>
<td>2.480 (1.985–2.975)</td>
<td>−1.824 to 6.784</td>
<td></td>
</tr>
</tbody>
</table>

MDCT-e, multidetector computerized tomography enteroclysis; MR-e, magnetic resonance imaging enteroclysis.

a Mean difference calculated by subtracting size of nodule measured by imaging technique from size of nodule measured on histology.

b Limits of agreement calculated as mean difference ± 2 SDs of the difference.
Both MDCT-e and MRI-e underestimated the size of the endometriotic nodules; in both imaging techniques the underestimation was greater for nodules with diameter ≥30 mm (Table 2).

The mean (±SD) overall scanner room occupation time was 27.3 ± 4.1 min for MDCT-e and 45.0 ± 3.6 min for MRI-e (p < 0.001).

3.3. Tolerability and adverse effects of MDCT-e and MRI-e

During MDCT-e, no patient had intolerance to iiodinated contrast medium or adverse reactions to it. The colonic distension was tolerated in all the cases and no patient required interrupting the exam. The MRI-e was safely performed in all the patients; there was no adverse reaction to paramagnetic contrast medium. During the injection of the ultrasonography jelly in the recto-sigmoid, none of the patients showed signs of severe discomfort or allergic reactions. The mean (±SD) intensity of pain experienced by the patients was significantly lower during MRI-e (2.5 ± 0.7) than during MDCT-e (5.8 ± 1.2; p < 0.001). Severe pain was experienced by 156 women (60.0%) undergoing MDCT-e and by 26 women (10.0%) undergoing MRI-e, moderate pain was experienced by 100 women (38.4%) undergoing MDCT-e and by 139 women (53.4%) undergoing MRI-e, mild pain was experienced by four women (1.5%) undergoing MDCT-e and by 95 women (36.5%) undergoing MRI-e (p < 0.001).

4. Discussion

To the best of our knowledge, this is the first prospective study comparing the effectiveness of MDCT-e and MRI-e in the diagnosis of recto-sigmoid endometriosis. This study demonstrates that both techniques have similar accuracy in diagnosing recto-sigmoid endometriosis. The non-invasive diagnosis of endometriotic nodules infiltrating the intestinal muscularis propria is relevant to identify patients requiring treatment. Intestinal nodules can be excised by segmental resection or nodulectomy accordingly to the preference of the surgeon and to the
characteristics of the lesions (size and depth of infiltration in the intestinal wall) [11]. Alternatively, medical therapies (norethisterone acetate, gonadotropin releasing hormone analogues and 5-HT4 receptor agonists) may be used to treat intestinal symptoms caused by rectosigmoid endometriotic nodules that do not cause a stenosis of the bowel lumen [12,13].

Several authors proposed MR for the diagnosis of bowel endometriosis. In fact, MR has sensitivity between 77% and 95%, specificity between 89% and 100%, PPV between 94% and 100% and NPV between 77% and 99% for the diagnosis of bowel endometriosis [9,14,3,15,16]. This is not the first study combining MR with jelly distention to facilitate the diagnosis of endometriosis. Injection of ultrasonographic jelly in the vagina and the rectum combined with MR has previously been described for the diagnosis of rectovaginal endometriosis and obliteration of the cul-de-sac [17].

MDCT-e with the retrograde enema of the entire colon provides a complete overview of the whole colon. A potential weakness of the current study consists in the fact that MRI-e does not examine the whole colon but only the rectosigmoid wall. Therefore, the current study examined the accuracy of MDCT-e and MRI-e only in the detection of recto-sigmoid nodules. The use of water retrograde distension (as in MDCT-e) may allow full colonic distention during MR. It has previously been shown that MR targeted to the pelvis may be combined with contrast-enhanced MR-colonography to evaluate the whole colon [18]. However, the whole colon MRI-e study requires more time than MDCT-e, a complete colonic distention is sometimes difficult to be tolerated for the time required to complete all MRI-e sequences, and, last but not least, a minimal intestinal cleansing is required. In our experience, the use of diluted gel decreases the quantity of the injected fluid because of its high density. Furthermore, the ultrasonographic gel diluted with saline solution remains in the rectum during the examination, while saline solution may leave the rectum and the sigmoid colon, following the gravity toward the transverse colon; in addition, in the mixed solution, the absorption of the water is minimized. Furthermore, the low incidence of right colon endometriosis [19] reduces the need of routinely evaluate the entire large bowel. Intestinal hypotonization is routinely performed during MDCT-e and contrast-enhanced MR-colonography but it is not required during MRI-e, in fact, in all performed MR studies, no artifact reduced images quality. During the distension of the whole colon required for MDCT-e, the hypotonization increased the tolerability of the exam and it may also reduce the risk of artifacts caused by intense peristalsis [6,7].

A potential limitation of the current study consists in the fact that a distension of the whole colon was performed during MDCT-e while only the rectosigmoid was distended during the MRI-e. Methodologically, during MDTC, we could have performed an enema only of the rectum and sigmoid; this could have made more similar the two radiological techniques. However, a distension of the whole colon was performed during the MDTC because this was the technique previously described [6–8] and it allows to provide more clinical information.

Another limitation of the study is that the two techniques were not used to diagnose pelvic endometriosis but only rectal and sigmoid nodules. However, this comparison could have not been feasible, in fact, while it is well known that MR is the gold standard for the evaluation of all pelvic endometriotic lesions [20], CT is not used to diagnose pelvic endometriosis. However, in clinical practice the most important preoperative diagnosis is to identify the involvement of the bowel. In fact, intestinal surgery requires an extensive preoperative consent and the gynecologist, who usually operates patients with endometriosis, needs the assistance of the colorectal surgeon to perform this type of procedures. Another strength of MR consists in the fact that radiations are not required and this is particularly relevant in a population of women of reproductive age.

A strength of the current study is that it included a large sample of patients with suspicion of rectosigmoid endometriosis and over 60% of the patients had intestinal nodules. It was possible to recruit this population of patients because the study was performed in a referral center for the diagnosis and treatment of endometriosis.

Obviously the experience of the radiologist in CT and MR colon study may influence the accuracy of these techniques in diagnosing bowel endometriosis. In the current study, the extensive experience and technical familiarity of the authors with CT enema performance may have improved the accuracy of diagnosis, which may be more challenging for other radiologists. In contrast, the MR pattern of endometriosis, the availability of different sequences, the complementary pattern in T1W and T2W sequences may facilitate all radiologists in diagnosing of bowel endometriosis.

5. Conclusions

In conclusion, this prospective study demonstrates that both MDCT-e and MRI-e are accurate in the diagnosis of rectosigmoid
endometriosis. MDCT-e has the disadvantage of the use of ionizing radiation and iodinated contrast medium in a population of women of reproductive age. The request of the clinician to ideally evaluate the whole colon should be balanced with the fact that the incidence of intestinal endometriosis in the right, transverse and descending colon is low. MRI-e is more tolerable than MDCT-e; it is a study focused on the pelvis and on the sigmoid and rectum, is has satisfying sensitivity and specificity in identifying nodules in the distal colon. Future studies should aim to improve the evaluation of the patients to better understand when MDCT-e may be advisable in order to perform a whole evaluation of the colon.

References