

Deep Infiltrating Endometriosis: Transabdominal and Transvaginal US Features

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Aims and objectives

Endometriosis is defined as the presence of endometrial glands and stroma at extrauterine sites throughout the pelvis and beyond. Lesions are typically located in the pelvis but can occur at multiple sites including the bowel, diaphragm, and pleural cavity. While endometriosis is a common and nonmalignant process, ectopic endometrial tissue and resultant inflammation can cause dysmenorrhea, dyspareunia, chronic pain, and infertility. Endometriosis is an estrogen-dependent, benign, inflammatory disease that affects women during their premenarcheal, reproductive, and postmenopausal hormonal stages.

Endometriotic lesions in the pelvis can be categorized as superficial peritoneal, ovarian, and **deep infiltrating endometriosis (DIE)**. Rectovaginal and bowel endometriosis are forms of DIE, which is defined as an endometriotic lesion located at least 5 mm beneath the peritoneal surface. Therefore, DIE of the bowel invades at least the level of the bowel muscularis. Endometriotic foci located on the bowel serosa that do not meet these criteria are defined as peritoneal endometriosis and not as deep infiltrating bowel endometriosis. The bowel is the most common site of extragenital endometriosis. Bowel endometriosis occurs in 12%-37% of women with DIE.

The purpose of this study is to review the findings of deep infiltrating endometriosis (DIE) on abdominal and transvaginal ultrasound, describing the image patterns and their correlation with MRI imaging.

Methods and materials

A retrospective study was performed (from 2009 to 2016), which included 29 patients with echographic diagnosis of DIE. The findings were confirmed by surgery, histopathology and / or MRI.

The ultrasound findings assessed were the following:

- Endometriotic foci morphology: nodular, laminar (plaque-like), pseudonodular with tails at their ends.
- Margins: smooth, microlobulated or spiculated.
- Echo pattern: hypoechoic, hyperechoic or mixed content.
- Anatomic location: bowel endometriosis or anterior, middle or posterior compartment of the pelvis. The contents of the anterior compartment of the pelvis include the urinary bladder, ureters and urethra. The middle compartment contains the female genital organs, including the ovaries, uterine tubes, uterus, and vagina. The broad ligaments are peritoneal folds between the uterus and the lateral walls of the pelvis and are also a part of the rectouterine and vesicouterine folds. The contents of the posterior compartment of the pelvis include the rectovaginal septum (located between the posterior vaginal wall and the anterior rectal wall), torus uterinus (small transverse thickening that binds the original insertion of the uterosacral ligaments behind the posterior cervix), retrocervical area (virtual extraperitoneal space behind the cervix, situated in the same plane as the rectovaginal pouch and above the rectovaginal septum) and rectovaginal pouch or pouch of Douglas.

We used a Toshiba Applio XG ultrasound (Toshiba, Tohio, Japan) with convex transducers of 3-6 MHz and 6-10 MHz, and endocavitary 6-8 MHz.

Results

Abdominal and transvaginal ultrasound were performed in 18 patients, while abdominal ultrasound alone was performed in the remaining 11 patients. In most of them (27 cases) MRI was also performed. The findings were confirmed by surgery and histopathology in 26 patients. The remaining 3 had compatible findings on MRI.

A total of **44 endometriotic foci** in different pelvic locations were identified (bladder, ureter, ovaries, uterus, rectovaginal septum, retrocervical area, rectovaginal pouch and bowel endometriosis).

The most frequent location was the posterior compartment of the pelvis: bowel endometriosis of the rectosigmoid junction was found in 11 cases (25%), 8 diagnosed with abdominal ultrasound and 3 with transvaginal ultrasound; and rectovaginal septum in 6 cases (13%), all of them diagnosed with transvaginal ultrasound.

The second most frequent location was the central compartment (9 cases, 20%), all diagnosed with transvaginal ultrasound. **Other locations included:** endometriosis of ileum and cecal region (6 cases, 5 of them seen on abdominal ultrasound) and of the anterior compartment of the pelvis (urinary bladder and ureter, all of them visualized with transvaginal ultrasound).

We were able to describe **characteristic patterns in the bowel endometriosis of the rectosigmoid junction:** pseudonodular morphology adhered to the serosa and bowel muscularis. The margins were smooth or microlobulated, with a marked thinning (pseudo tail sign) (Fig. 1A). In this location, the implants caused low retraction of adjacent structures.

Ileum and cecum endometriosis presented more frequently a laminar (plaque-like) morphology and spiculated margins that caused short stenoses (Fig. 1B).

We observed 4 cases in the bladder wall, 3 of them with nodular morphology and 1 with pseudonodular morphology with tail. The implant located in the ureter, with laminar morphology and spiculated margins, caused severe hydronephrosis.

Laminar (plaque-like) morphology with retraction of adjacent structures was characteristic in the rectovaginal septum (Fig. 1C).

Nodular morphology often showed a heterogeneous echogenicity identifying small hypoechoic images inside (Fig. 1D).

In the literature, different types of echogenicities of the endometriotic implant have been described: hypoechoic, echogenic and heterogeneous. In our series, hypoechoic implants were the most common (21 cases). The rest (8 cases) presented heterogeneous echogenicity.

Most of the patients presented endometriosis in other pelvic locations, mainly ovarian endometriomas, which facilitated the diagnosis.

Images for this section:

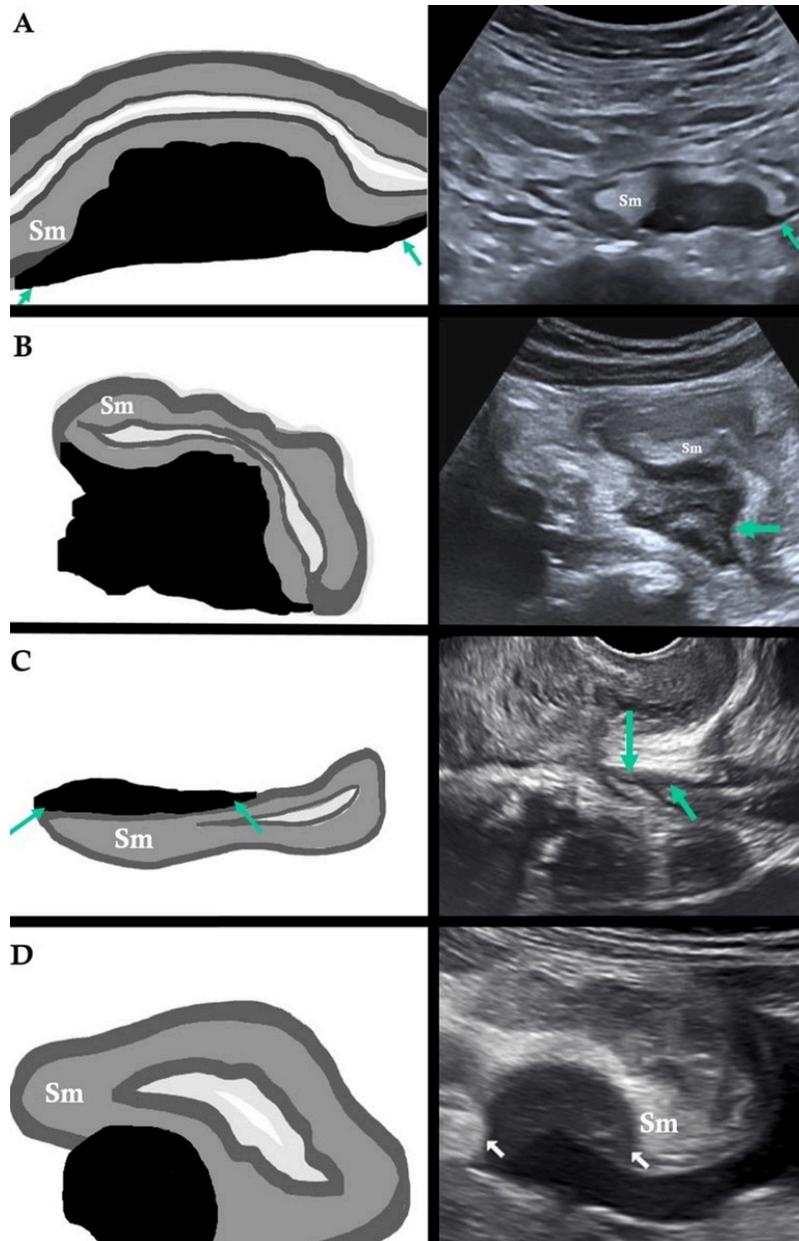


Fig. 1: Graphic representation (left) and ultrasound image correlation (right) of the morphology and margins of bowel endometriosis. (A) Endometriotic lesion with pseudonodular shape and lobulated margins adhered to the intestinal wall invading up to the submucosa layer (Sm). Green arrows point to the tails at the ends of the lesion. (B) Nodular shape with spiculated margins and retraction of the small Bowel. (C) Lamellar morphology and smooth margins. Frequently this morphology causes retraction of adjacent structures. (D) Nodular morphology, smooth margins.

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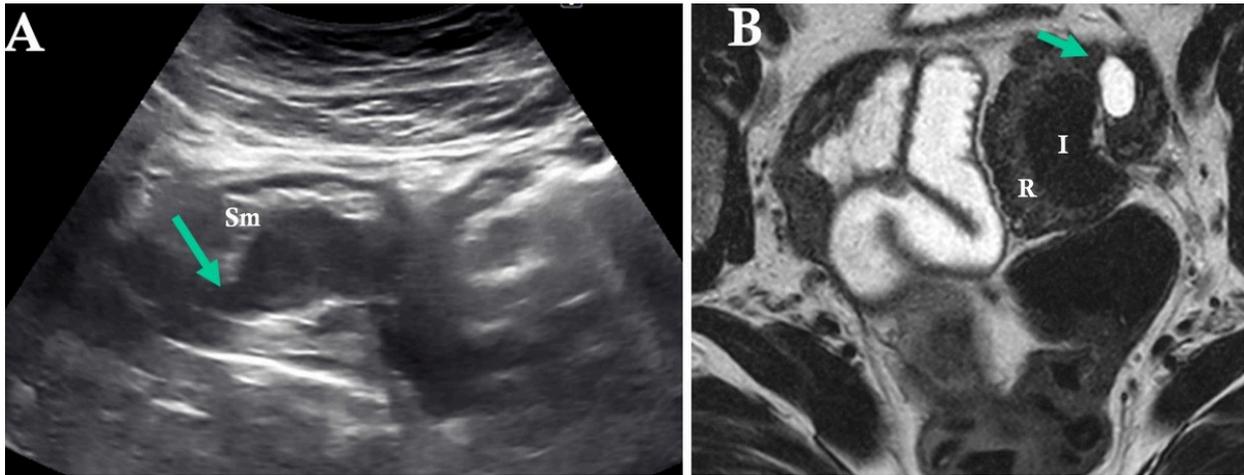


Fig. 2: Endometriotic infiltrating lesion in the intestinal wall. (A) Hypoechoic and heterogeneous lesion infiltrating the intestinal wall, with pseudonodular with tails at their ends morphology (arrow). (B) The T2-image demonstrate pseudonodular-shape hypointense lesion with displacement of left ovary (arrow). Sm: Submucosa, R: Rectum, I: Implant.

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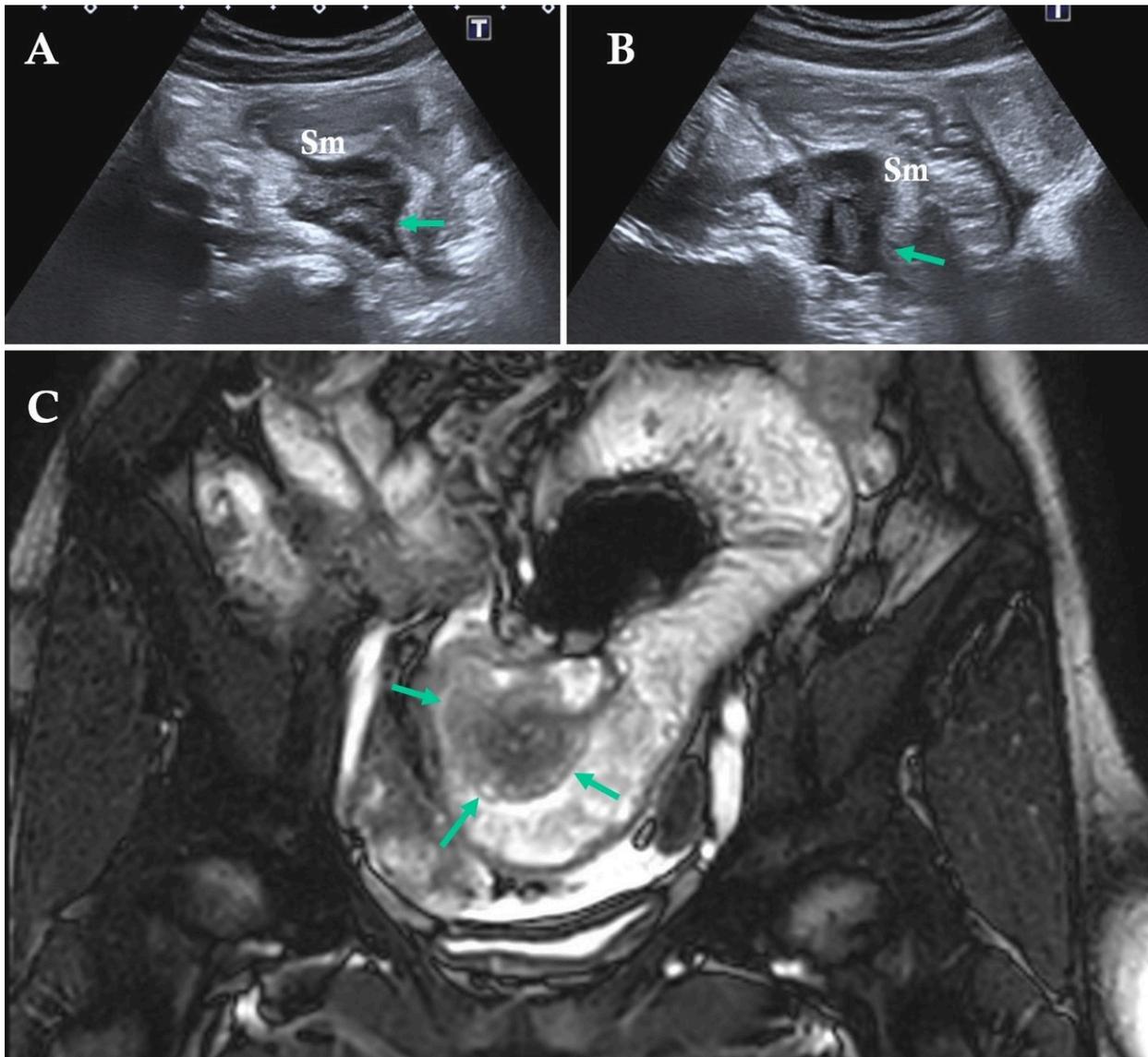


Fig. 3: Endometriotic infiltrating lesion in the intestinal wall. (A,B) Hypoechoogenic and heterogeneous lesion infiltrating the intestinal wall, with pseudonodular morphology and spiculated margins (arrow). (C) The T2-image demonstrate pseudonodular-shaped hypointense lesion with small bowel stenosis (arrows). Sm: Submucosa.

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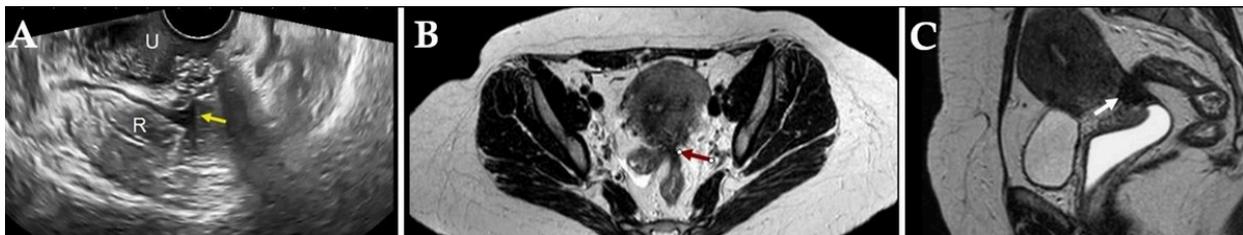


Fig. 5: Deep infiltrating endometriosis. Transvaginal ultrasound (A) and T2-images (B,C) showing deep infiltrating endometriosis in the posterior fornix and torus uterinus. There is infiltration of the bowel wall (arrows). U: Uterus, R: Rectum.

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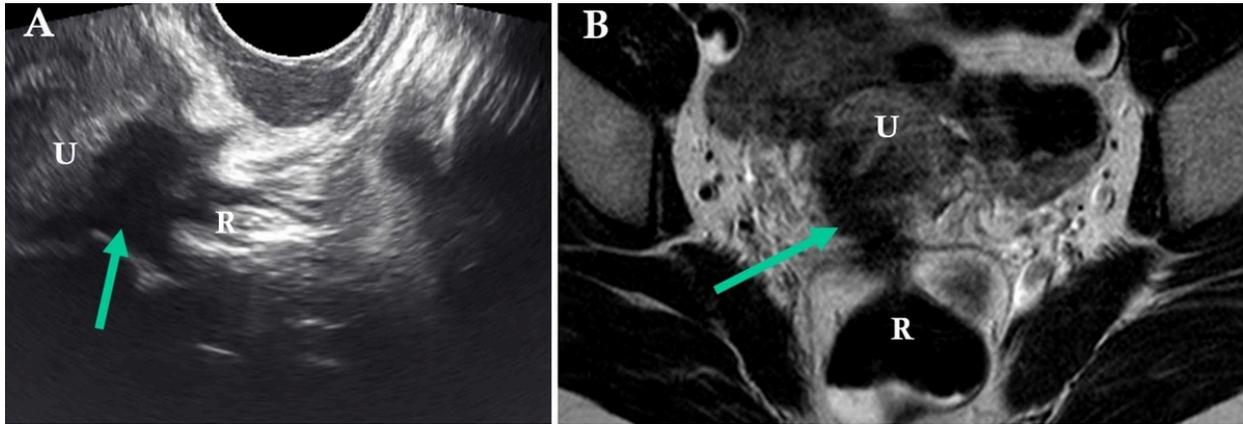


Fig. 6: Endometriotic involvement of the posterior pelvic compartment. Transvaginal ultrasound (A) and T2-images (B,C) showing deep infiltrating endometriosis in the rectovaginal pouch. There is infiltration of the bowel wall (arrows). Note the spiculated margins of the lesion. U: Uterus, R: Rectum.

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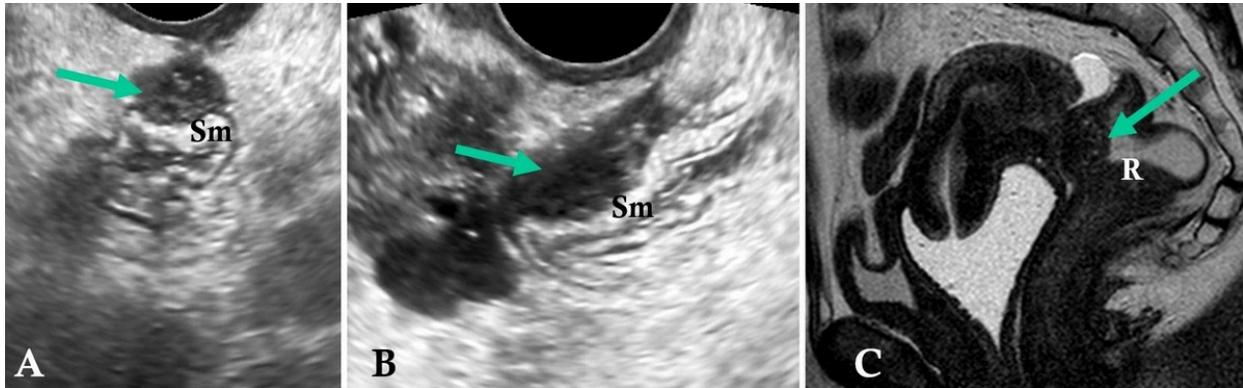


Fig. 7: Endometriotic infiltrating lesion in the rectal wall. Transvaginal ultrasound (A,B) and T2-images (C) showing deep infiltrating endometriosis in the rectal wall (arrows).

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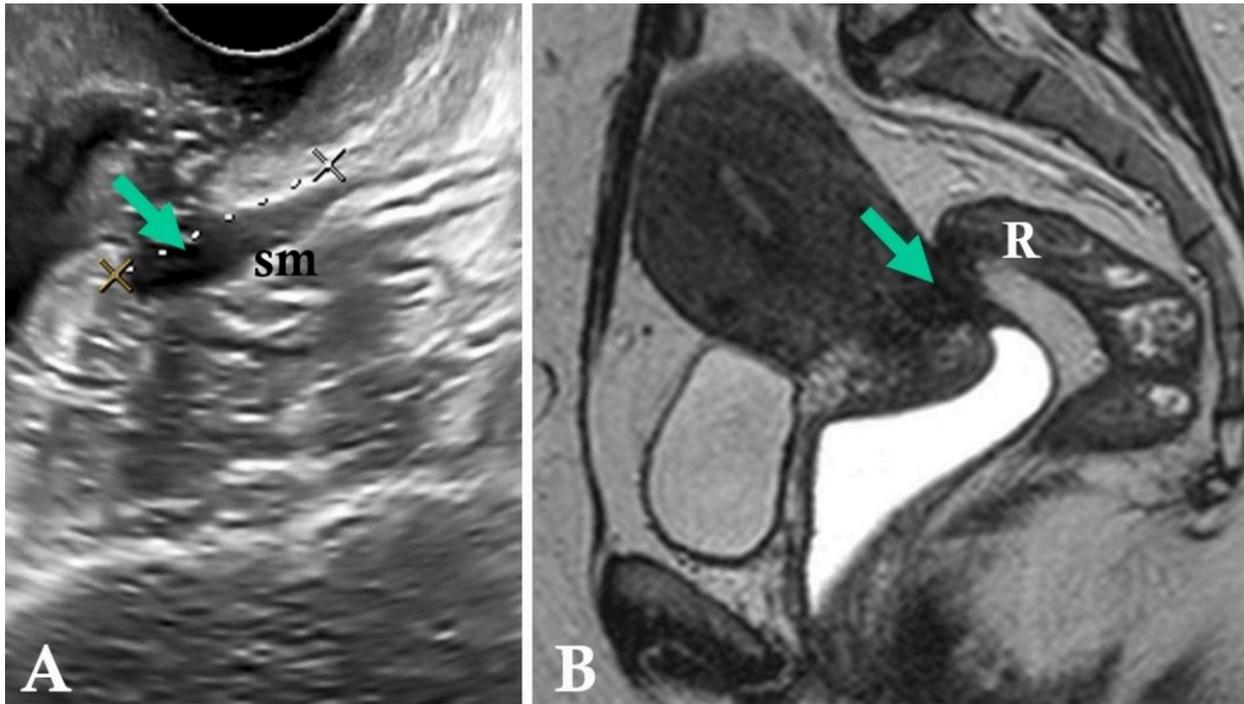


Fig. 8: Endometriotic involvement of the posterior pelvic compartment. Transvaginal ultrasound (A) and MR imaging (B) showed retrocervical endometriosis. Sagittal T2-weighted MR images show an irregular hypointense mass that extends from the posterior cervix inferiorly to the vaginal fornix. There is infiltration of the bowel wall (arrows).

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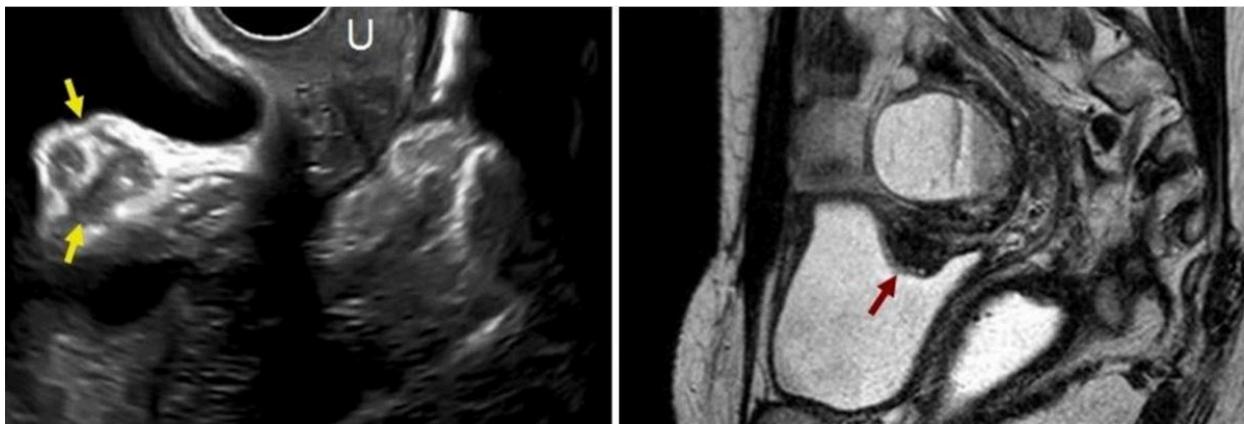


Fig. 9: Bladder endometriosis. Transvaginal ultrasound (A) and MR imaging (B) shows irregular focal wall thickening (arrow) of the bladder. Note endometrioma with hypointensity on T2 (shading), fluid-fluid levels on T2.

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Conclusion

Abdominal and transvaginal ultrasound are usually the first imaging tests in the assessment of DIE. They are useful tools in the detection and especially, in the characterization of DIE presenting high correlation with the MRI findings. Bowel endometriosis is one of the most severe forms of DIE. The recognition of these findings and the ultrasound appearance facilitates the orientation and management of these patients.

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