Bladder Endometriosis: Ultrasound and MRI Findings

Sean D. Beaty, Alvin C. Silva, Giovanni De Petris

Bladder endometriosis is a rare cause of a localized bladder mass, potentially mimicking a neoplasm at cross-sectional imaging. We present the case of a patient with cyclic pelvic pain and urinary symptoms secondary to bladder endometriosis, with characteristic pelvic ultrasound and magnetic resonance imaging findings. Potential pathological mechanisms are discussed.

Introduction

Endometriosis represents the presence of endometrial glands or stroma in abnormal locations outside the uterine cavity [1]. It has an estimated prevalence of 10% in women of reproductive age, with a peak incidence between 30 and 45 years of age [2]. Patients most often present with dysmenorrhea, dyspareunia, infertility, painful defecation or cyclic urinary symptoms. The most common peritoneal sites (in order of decreasing frequency) include the ovaries, uterine ligaments, cul de sac and pelvic peritoneum reflected over the uterus, fallopian tubes, rectosigmoid region, and bladder [2].

Extraperitoneal presentation of endometriosis is rare, but includes superficial implants as a result of prior gynecological surgery [3] as well as intrathoracic involvement [4]. Imaging modalities currently used to diagnose pelvic endometriosis include ultrasound and magnetic resonance imaging (MR). In this report, we present a case of bladder endometriosis depicted at both ultrasound and MR and review the potential pathological mechanisms and typical imaging features.

Case Report

A 50-year-old gravida 0, para 0 woman presented for evaluation of severe bladder and pelvic symptomatology of several months duration, associated with ovulation and with her menstrual cycle. The patient reported significant left lower quadrant discomfort and pressure, especially during urination, described as feeling similar to a bladder infection, but occurring at mid cycle and with her menses. Interestingly, she had reported similar symptoms six years prior to her presentation but did not pursue further treatment as her symptoms abated, only to recur and progressively worsen. The patient described a history of uterine fibroids based on a remote outside pelvic ultrasound, which was otherwise negative. She reported normal periods without breakthrough bleeding, and an otherwise unremarkable gynecological history. Pelvic examination discovered a mildly enlarged, irregular uterus with a palpable 3 to 4-cm anterior mass, suspected to represent a fibroid, but no adnexal masses.

Pelvic ultrasound revealed an irregular 4.0-cm mass anterior to and separate from the uterus, invaginating the urinary bladder (Figure 1). Subsequent magnetic resonance imaging showed an irregular mass (arrow) situated anterior to the uterus (U), invaginating the urinary bladder (BL).
imaging (MRI) of the pelvis demonstrated the solid mass to be located within the dome of the urinary bladder, closely abutting but separate from the uterus, either arising from the superior wall or invading the bladder from the supravesical space (Figure 2). The mass was hypointense on T2-weighted sequences, but similar in signal to the more normal appearing bladder wall. T1-weighted sequences showed hyperintense areas of hemorrhage along the mucosal surface of the bladder, with mild enhancement of the mass noted following contrast administration. In addition, the anteverted uterus contained three distinct fibroids and a normal transitional zone, precluding adenomyosis. Differential considerations included endometriosis involving the bladder wall, an unusual primary bladder neoplasm, or a drop metastasis from an occult intra-abdominal primary tumor. Given that patient’s symptoms were associated with her menses, bladder endometriosis was favored as the mostly likely etiology.

The patient subsequently underwent laparoscopic segmental bladder resection, with the pathologic specimen showing multiple foci of endometriosis in the bladder wall (Figure 3) and vesicovaginal septum. At time of surgical inspection, the anterior uterine wall was completely fixed to the bladder where gross endometriosis was visualized. In addition, there were other sites that were suspicious for endometrial implants at visual inspection (including appen-
Bladder Endometriosis: Ultrasound and MRI Findings

Figure 3. Low power view of the bladder wall (Hematoxylin–Eosin stain 50X, mucosa to the right). Endometriotic glands form variably sized cysts (*) in the submucosa of the bladder and in the muscularis propria (not shown).

dix, left broad ligament and right uterosacral ligament, and left fallopian tube) but only the left fallopian tube was positive at pathologic review. Myomectomies confirmed uterine leiomyomas without atypical features.

Discussion

Bladder endometriosis, defined as bladder wall involvement with invasion of the detrusor muscle, is a rare condition constituting roughly 6% of all endometriosis cases [5]. While lower urinary symptoms including urgency, frequency, suprapubic pain, hematuria, dysuria and urge incontinence are described to occur in temporal “cyclic” relationship to monthly menstruation in 40% of patients, the majority (60%) will present with noncyclic symptoms [6]. The exact pathophysiological mechanism of this disorder is controversial but there are three leading theories for the origin of bladder endometriosis: 1) it develops from mullerian remnants in the vesicouterine/vesicovaginal septum; 2) it is in fact an extension of an adenomyotic nodule of the anterior uterine wall; or 3) it results from implantation of regurgitated endometrium [7].

Supporting the hypothesis that the pathogenesis is related to intraperitoneal seeding of regurgitated endometrial cells, one series found no detectable adenomyosis in the anterior uterine wall in 19 of 20 patients with bladder endometriosis, thus excluding direct extension from the uterus in the vast majority [7]. In the same series, no patient with bladder endometriosis had a retroverted uterus, meaning all patients had an anterior cul-de-sac present to collect cells. Given these observations, bladder endometriosis is likely due to endometrial cells collecting in one of the most dependent portions of the peritoneal cavity, the anterior cul-de-sac, with ultimate invasion of the detrusor muscle. The rectovaginal presentation of endometriosis also supports this pathogenesis, as the posterior cul-de-sac is the other most dependent portion of the peritoneal cavity. Transabdominal and transvaginal ultrasound is the initial modality of choice in evaluation of suspected bladder endometriosis due to immediate availability and easy access [8]. Localized bladder wall thickening can be appreciated at ultrasound, lending to the differential diagnoses of bladder endometriosis, subserosal anterior leiomyoma, and bladder cancer. However, MR can not only accurately delineate the morphologic abnormalities of bladder endometriosis, but also potentially identify other more common sites, particularly at the uterosacral ligament, where ultrasound is less reliable. Typical MR features include localized or diffuse bladder wall thickening involving the dome/posterior wall and heterogeneous T2-isointensity with occasional T1 hyperintense foci [9]. Although not always seen, the detection of hyperintense foci on precontrast T1-weighted images is highly sensitive for the presence of endometriosis, nicely illustrated in this case. MR also accurately evaluates the distal ureters which may become obstructed, more often by associated mass effect rather than direct invasion by endometriosis. This is pertinent to surgical planning as ureteral re-implantation may be required.

Treatment consists of surgical resection, either by laparotomy or laparoscopy. Recurrence rates are about 16 to 25% at 36 months [10]. Interestingly, if a 0.5 to 1.0 cm strip of adjacent myometrium is removed at time of vesical resection, recurrence rates are significantly less frequent [10]. From this, the investigators suggested recurrence may originate from adenomyotic foci of the anterior uterine wall, thus questioning the transtubal reflux theory of bladder endometriosis. While this is conceivable, recurrence could also be explained by residual microscopic endometrial implants which have invaded the anterior uterine wall from prior episodes of endometrial reflux or direct extension from the bladder. At one-month follow-up, our patient recovered well from surgery and had excellent pain relief, including no discomfort or pressure with her menstrual cycle.

In summary, this case report highlights the typical sonographic and MR imaging features of bladder endometriosis in a patient with a classic clinical presentation of the disease. Knowledge and recognition of this uncommon entity is necessary for optimal surgical planning and satisfactory treatment.

References

1. Olive DL, Schwartz LB. Endometriosis. N Engl J Med. 1993 Jun 17;328(24):1759-69. [PubMed]
2. Kinkel K, Frei KA, Balleyguier C, Chapron C. Diagnosis of endometriosis with imaging: a review. Eur Radiol. 2006 Feb;16(2):285-98. [PubMed]
3. Balleyguier C, Chapron C, Chopin N, Helenon O, Menu Y. Abdominal wall and surgical scar endometriosis: results of magnetic resonance imaging. Gynecol Obstet Invest. 2003;55(4):220-4. [PubMed]
4. Alifano M, Trisolini R, Cancellieri A, Regnard JE. Thoracic endometriosis: current knowledge. Ann Thorac Surg. 2006 Feb;81(2):761-9. [PubMed]

5. Chapron C, Fauconnier A, Vieira M, Barakat H, Dousset B, Pansini V, Lacher-Lavenu MC, Dubuisson JB. Anatomical distribution of deeply infiltrating endometriosis: surgical implications and proposition for a classification. Hum Reprod. 2003 Jan;18(1):157-61. [PubMed]

6. Fauconnier A, Chapron C, Dubuisson JB, Vieira M, Dousset B, Breart G. Relation between pain symptoms and the anatomic location of deep infiltrating endometriosis. Fertil Steril. 2002 Oct;78(4):719-26. [PubMed]

7. Vercellini G, Frontino A, Pisacreta O, De Giorgi M, Cattaneo M, Crosignani PG. The pathogenesis of bladder detrusor endometriosis. Am J Obstet Gynecol. 2002 Sep;187(3):538-42. [PubMed]

8. Balleyguier C, Chapron C, Dubuisson JB, Kinkel K, Fauconnier A, Vieira M, Helenono O, Menu Y. Comparison of magnetic resonance imaging and transvaginal ultrasonography in diagnosing bladder endometriosis. J Am Assoc Gynecol Laparosc. 2002 Feb;9(1):15-23. [PubMed]

9. Kinkel K, Chapron C, Balleyguier C, Fritel X, Dubuisson JB, Moreau JF. Magnetic resonance imaging characteristics of deep endometriosis. Hum Reprod. 1999 Apr;14(4):1080-6. [PubMed]

10. Fedele L, Bianchi S, Zanconato G, Bergamini V, Berlanda N, Carmignani L. Long-term follow-up after conservative surgery for bladder endometriosis. Fertil Steril. 2005 Jun;83(6):1729-33. [PubMed]