Sonography of Adenomyosis

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Invited paper

The Sound Judgment Series consists of invited articles highlighting the clinical value of using ultrasound first in specific clinical diagnoses where ultrasound has shown comparative or superior value. The series is meant to serve as an educational tool for medical and sonography students and clinical practitioners and may help integrate ultrasound into clinical practice.

Received February 14, 2012, from the Department of Obstetrics and Gynecology, Eastern Virginia Medical School, Norfolk, Virginia USA. Revision requested February 25, 2012. Revised manuscript accepted for publication February 28, 2012.

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Abbreviations
MRI, magnetic resonance imaging

Adenomyosis was first described by Rokitansky in 1860 as "cystosarcoma adenoides uterinum" and was later defined by Von Recklinghausen in 1896. It is a common condition that predominantly affects women in the late reproductive years. Adenomyosis has been noted to occur in about 30% of the general female population and in up to 70% of hysterectomy specimens depending on the definition of the entity.[1] The diagnosis can be made with sonography or magnetic resonance imaging (MRI), but this article will show that sonography should be the imaging modality of choice for adenomyosis.

Definition

Adenomyosis is defined by the presence of ectopic endometrial glands and stroma within the myometrium. The presence of ectopic endometrial glands and stroma induces a hypertrophic and hyperplastic reaction in the surrounding myometrial tissue.

Clinical Presentation

Most patients with adenomyosis are asymptomatic. Symptoms related to adenomyosis include dysmenorrhea, dyspareunia, chronic pelvic pain, and menstrual menometrorrhagia. Adenomyosis presents most commonly as a diffuse disease involving the entire myometrium (Figure 1). It can also present in a focal area of the uterus, known as adenomyoma (Figure 2). Adenomyosis can also be associated with other conditions, such as leiomyomata, endometrial polyps, and endometriosis.[2] The establishment of the clinical diagnosis of adenomyosis is difficult because of its vague presenting symptoms. A homogeneously enlarged (globular) uterus on pelvic examination is suggestive of the diagnosis.

Diagnosis

The diagnosis of adenomyosis is made on a pathologic specimen, obtained after hysterectomy. The pathologic diagnosis is dependent on the visualization of endometrial glands and stroma in more than 1 low-powered field (2.5 mm) from the endometrial basalis layer.[3] The diagnosis can also be made by imaging with the use of sonography or MRI. A recent meta-analysis on the accuracy of sonography in the diagnosis of adenomyosis showed that it had sensitivity of 82.5% (95% confidence interval, 77.5–87.9) and specificity of 84.6% (79.8–89.8) with a positive likelihood ratio of 4.7 (3.1–7.0) and a negative likelihood ratio of 0.26 (0.18–0.39).[4] The sensitivity

and specificity of MRI in diagnosing adenomyosis are similar to those for sonography and have been reported as 77.5% and 92.5% respectively.[5] In the presence of adenomyosis, when the transvaginal ultrasound probe touches the corpus of the uterus, tenderness is commonly noted The presence of leiomyomata can adversely affect the diagnostic capability of sonography, and the presence of leiomyomata is generally associated with adenomyosis in 36% to 50% of cases.[1,6]

Sonographic Findings

The sonographic findings of adenomyosis, best obtained by transvaginal sonography, include the following[4–17]:

1. Uterine enlargement—Globular uterine enlargement that is generally up to 12 cm in uterine length and that is not explained by the presence of leiomyomata is a characteristic finding (Figure 3).
2. Cystic anechoic spaces or lakes in the myometrium—The cystic anechoic spaces within the myometrium are variable in size and can occur throughout the myometrium (Figure 4). The cystic changes in the outer myometrium may on occasion represent small arcuate veins rather than adenomyomas. The application of color Doppler imaging at low velocity scales may help in this differentiation.
3. Uterine wall thickening—The uterine wall thickening can show anteroposterior asymmetry, especially when the disease is focal (Figure 5).
4. Subendometrial echogenic linear striations—Invasion of the endometrial glands into the subendometrial tissue induces a hyperplastic reaction, which appears as echogenic linear striations fanning out from the endometrial layer (Figure 6).
5. Heterogeneous echo texture—There is a lack of homogeneity within the myometrium with evidence of architectural disturbance (Figures 1 and 4). This finding has been shown to be the most predictive of adenomyosis.
6. Obscure endometrial/myometrial border—Invasion of the myometrium by the glands also obscures the normally distinct endometrial/myometrial border (Figures 2–6).
7. Thickening of the transition zone—This zone is a layer that appears as a hypoechoic halo surrounding the endometrial layer. A thickness of 12 mm or greater has been shown to be associated with adenomyosis.

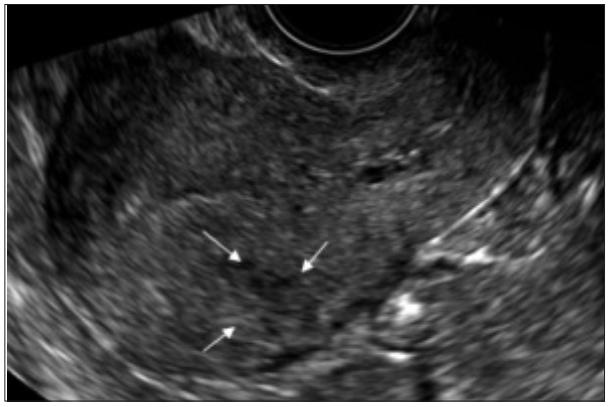


Figure 2. Focal adenomyoma (arrows).

Figure 1. Generalized adenomyosis.

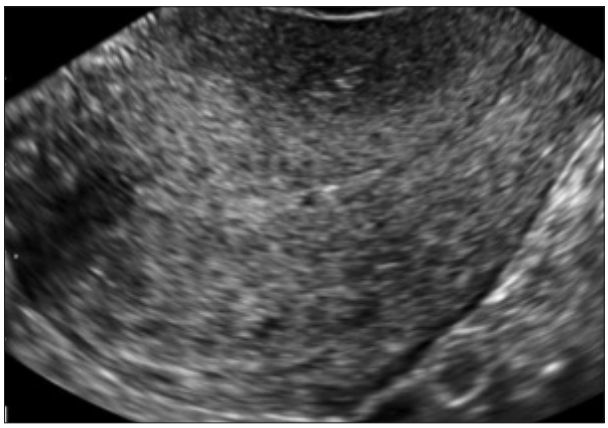
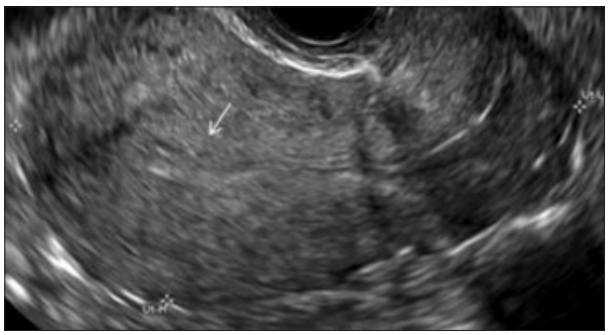


Figure 3. Globular uterine enlargement with an obscure endometrial/myometrial border (arrow).



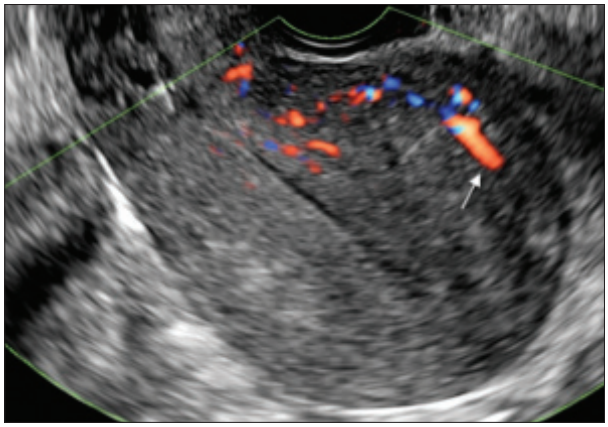


Figure 4. Anechoic cystic lacunae in the posterior uterine wall (arrow) with a heterogeneous echo texture.

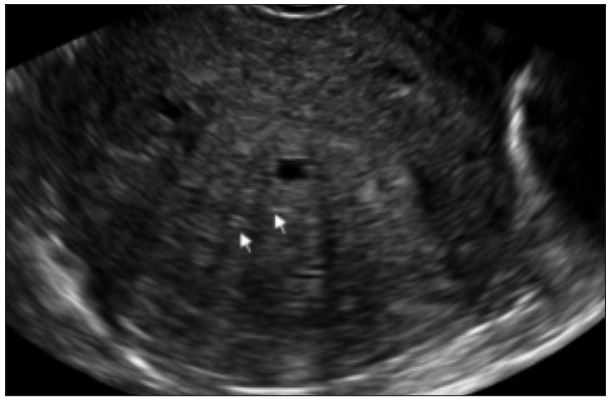
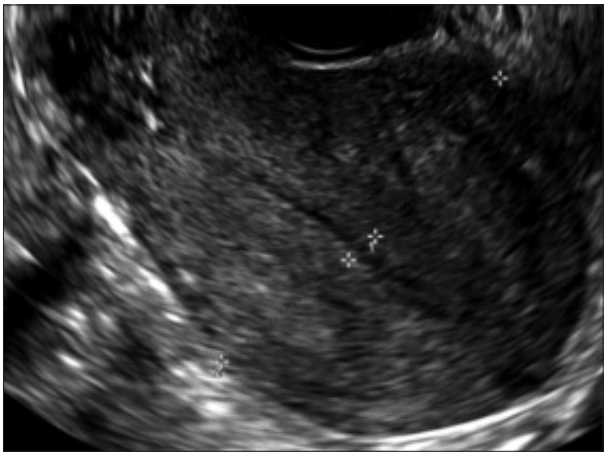


Figure 6. Linear striations (arrows) in the presence of a heterogeneous echo texture.

There is literature to support the observations that a globular uterus, cystic spaces, and linear striations are the most specific findings in the diagnosis of adenomyosis.[17] Chiang et al[16] used color Doppler sonography to differentiate adenomyosis from leiomyomas. In their study, 87% of the cases of adenomyosis had randomly scattered vessels or intramural signals. In 88% of leiomyoma cases, however, peripheral scattered vessels or outer feeding vessels were noted. In addition, in 82% of the adenomyomas, arteries within or around the uterine tumors had a pulsatility index of greater than 1.17, and 84% of leiomyomas had a pulsatility index of 1.17 or less.

Figure 5. Measurement of the length of a posterior uterine wall that is greater than that of the anterior wall (calipers) and has a heterogeneous myometrial echo texture.



Conclusions

Adenomyosis is a common finding in women of reproductive age. Most women with adenomyosis are asymptomatic. When symptomatic, adenomyosis can cause pelvic pain and abnormal uterine bleeding. The diagnosis of adenomyosis by sonography has been well defined and has diagnostic capabilities comparable to MRI. When a diagnostic imaging modality is required for suspected adenomyosis, sonography should be given first consideration given its efficacy, safety, and lower cost.

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