

Transvaginal Sonography and the Diagnosis of Adenomyosis

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Introduction

Menorrhagia, dysmenorrhoea and uterine enlargement (Fig 1) are common presentations in an outpatient clinic. These symptoms are quite non-specific in nature and frequently attributed to uterine leiomyomas. Adenomyosis, despite being commonly associated with these symptoms, is lesser known and diagnosed. To complicate matters further, leiomyomas and adenomyosis frequently coexist (Fig 2), hindering differential diagnosis and leading to suboptimal patient care. Therefore, establishing a definite diagnosis is more than just an academic exercise, as it would help select the appropriate therapy and greatly simplify management. Imaging plays an important role in evaluating myometrial lesions and the common diagnostic modalities available in an outpatient clinic are abdominal ultrasound scanning (AUS) and transvaginal sonography (TVS). The aim of this review is to delineate the specific sonographic features of adenomyosis.

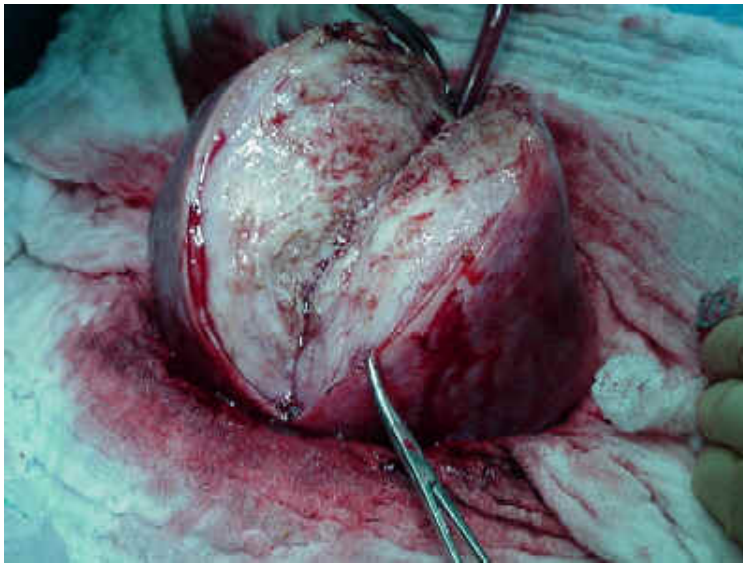


Fig 1. Cut section of an enlarged uterus showing diffuse adenomyosis.



Fig 2. An irregular uterus with coexisting adenomyosis and fibroids. The slide in the top corner demonstrates ectopic endometrial glands in myometrium



Fig 3. Graphic depiction of focal and diffuse adenomyosis

Pathophysiology

Adenomyosis is defined as the non-neoplastic presence of ectopic endometrial glands and stroma within the myometrium, associated with reactive overgrowth of the musculature (Fig 3). Its aetiology is currently unknown although a hereditary component is suggested¹. Two distinct forms have been described. The diffuse form has

multiple foci of adenomyosis distributed within the myometrium. The focal form, on the other hand, has isolated ill-defined nodules of hypertrophic myometrium and ectopic endometrium, sometimes also referred to as adenomyomas. Common to both these forms, there is associated myometrial hypertrophy, which causes a clinically enlarged and often soft or “boggy” uterus².

Adenomyosis is seldom seen in nullipara and postmenopausal women, being more common in the older woman of reproductive age. This has led to the association with uterine trauma as it is more often seen in patients who have had vigorous curettage during pregnancy termination, childbirth and manual placenta removal^{3,4}.

Diagnosis

Certain clinical features can help differentiate adenomyosis from leiomyoma, such as menorrhagia since childbirth and the presence of tenderness, which both point to adenomyosis as the cause. Nevertheless, there has been increasing reliance on imaging for differential diagnosis. Not only does imaging play a major role in the diagnosis and management of adenomyosis, it is also useful for the evaluation of treatment. Due to the non-specific nature of the symptoms, adenomyosis was not historically diagnosed via sonography and most enlarged uteri were wrongly attributed to uterine fibroids.

A change occurred in the late 1980s with the publication of reports using Magnetic Resonance Imaging (MRI) to diagnose adenomyosis. Findings which showed sensitivities and specificities in the region of 90% comparing MRI with histological diagnoses were described^{5,6}. Ascher comprehensively describes the technique and MRI features of adenomyosis using sagittal T2-weighted sequences⁷.

Equally important around that time were the advances in sonographic technology and techniques which included the advent of transvaginal sonography (TVS), higher resolutions and Colour Doppler. TVS transducers operate at higher frequencies (5-7.5 MHz) than those for AUS, allowing more image clarity. Many TVS criteria for adenomyosis were found to be similar to MRI with sensitivity of 80-86% and specificity between 50-96% with an overall accuracy of 68-86%⁸.

Sonographic features of adenomyosis

A brief description of the sonographic features of a normal uterus prior to viewing abnormal pathology is useful. The normal uterus displays 3 broad areas of varying echogenicity; a moderately echogenic myometrium, a hypoechoic area corresponding to the subendometrial muscle, and the endometrial echo which presents as a sharp interface but prone to changes depending on hormonal variation. Taking this into consideration, it is worth dividing the adenomyosis lesions broadly into the 3 distinct areas described.

The myometrium, in the presence of uterine enlargement, is asymmetrically thickened with areas of heterogeneity within it (Fig 4). The echogenicity of this myometrium varies depending on whether the lesion is diffuse or focal. Nevertheless, each hyperechoic region is surrounded by hypoechoic areas which correspond to smooth muscle hyperplasia. A discrete myometrial mass is generally not discernible but in the event of one being present it usually has very poorly defined margins (Fig 5) and does not alter the contour of the uterus⁹. These features and the lack of mass effect are distinguishing features of adenomyosis. To further differentiate between the two, the colour Doppler signal is internal and diffuse in adenomyosis as opposed to a leiomyoma where the signal is more peripheral.

A commonly seen feature is the anechoic mass, always multiple, which represents myometrial cysts corresponding to dilated glands or haemorrhagic foci. These cysts or lacunae are seen as round anechoic area of 1-7 mm (Fig 6). Colour Doppler could be used to differentiate a myometrial cyst from a vascular component. The myometrial cyst has been cited as the most specific and sensitive feature for the diagnosis of adenomyosis¹⁰.

The subendometrial layer might display small echogenic nodules which indicate ectopic endometrium.

Hyperechoic linear striations can be seen radiating out from the endometrial surface. These are thought to represent direct invasion of the myometrium by the endometrial zona basalis. Poor definition of the endo-myometrial junction suggests diffuse adenomyosis.

The exception to all these specific features is the polypoid adenomyoma located in the endometrial cavity which cannot be differentiated from other causes of endometrial polyps.

All these sonographic features have been reported to have high sensitivity (80-87%) and specificity (94-98%) in distinguishing between adenomyosis and leiomyoma based on comparisons between TVS and histological confirmation^{11,12}. The essential features are summarized in Table 1.



Fig 4. Sagittal transvaginal sonogram demonstrates heterogeneity of the anterior myometrium with areas of hypo- and hyper-echogenicity representing hypertrophied smooth muscle containing ectopic endometrial glands.

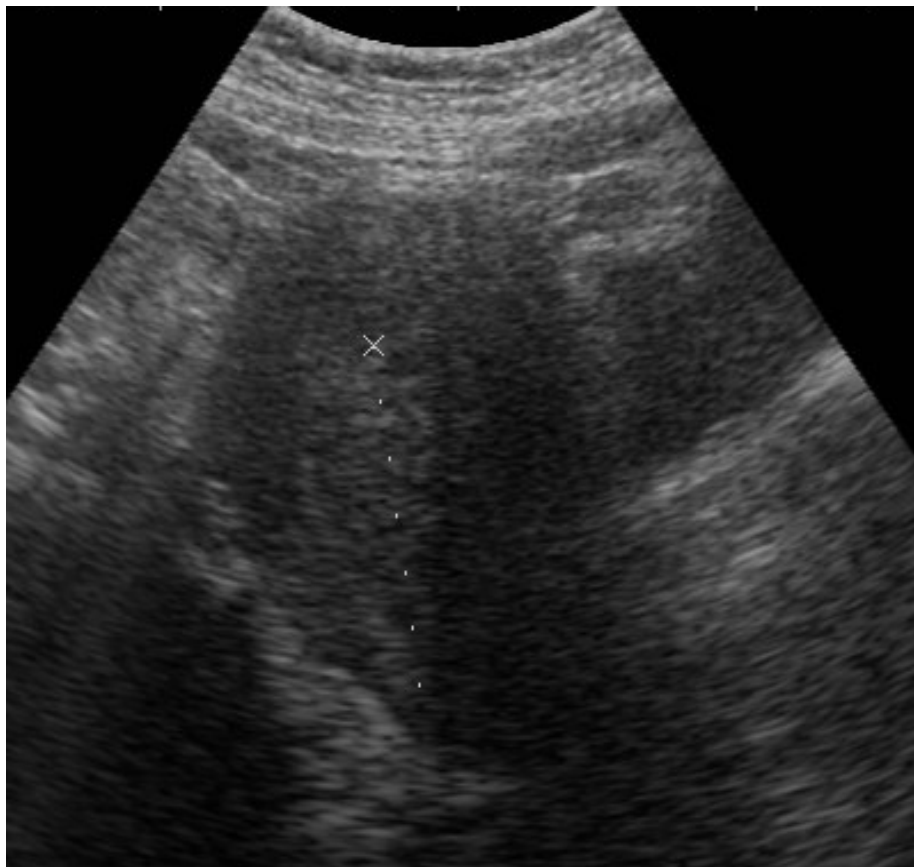


Fig 5. Sagittal transvaginal sonogram demonstrating an ill-defined mass within the posterior myometrium (between cursors).

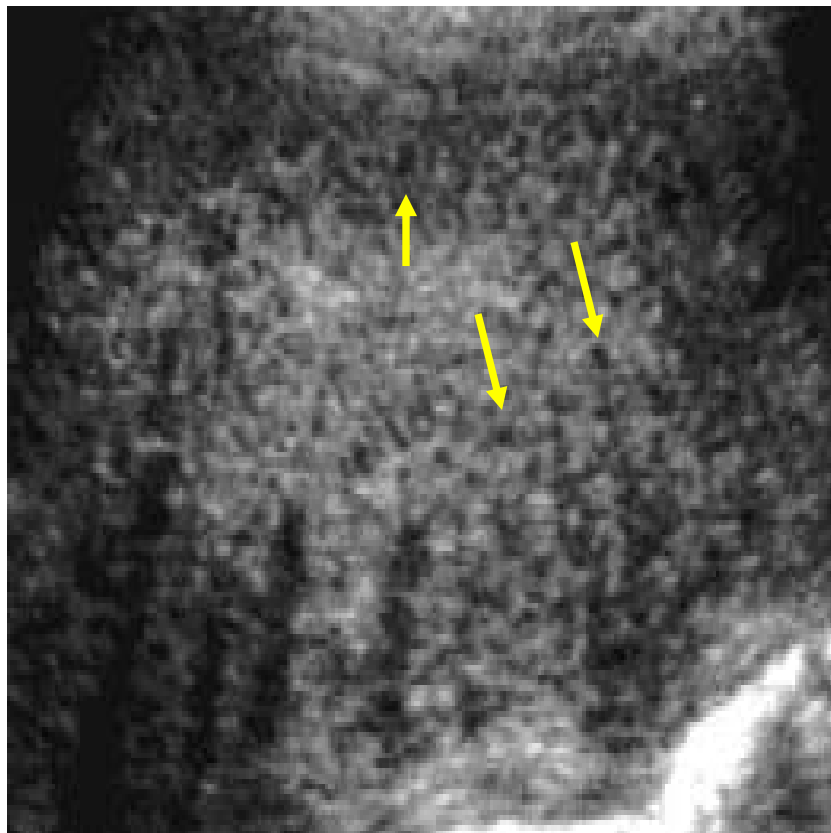


Fig 6. An enlargement of a transverse sonogram showing heterogeneity of the myometrium in diffuse adenomyosis. Multiple myometrial anechoic lacunae are seen (arrows).

- **Assymetrical myometrial thickening**
- **Heterogenous areas within myometrium**
- **Hyperechoic region surrounded by hypoechoic area**
- **No discrete myometrial mass**
- **If mass present, poorly defined margins**
- **Contour of uterus usually unaltered**
- **Myometrial cysts**
- Small echogenic nodules in subendometrial layer
- Hyperechoic linear striations radiating from endometrial surface
- Poor definition of the endo-myometrial junction

Table 1. Summary of important features of adenomyosis on TVS

Conclusion

The differentiation between adenomyosis and leiomyoma is essential for management optimization to ensure the best outcome for the patient. Imaging is the first line of investigation for any patient presenting with menorrhagia, pelvic pain and an enlarged uterus. TVS allows for the diagnosis of adenomyosis with high accuracy and it is the responsibility of the sonographer to be familiar with the features of adenomyosis; myometrial heterogeneity and asymmetrical thickening, cystic lesions, ill-defined masses, subendometrial nodules and endometrial striations. The presence of high resolution sonography as well as TVS in an outpatient setting has increased the capability of the clinician to make such a diagnosis.

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