

# A Clinical Study on Transvaginal Ultrasonography and its Histopathological Correlation in the Diagnosis of Adenomyosis

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## Abstract

**Objective:** The aim of this study is to evaluate the accuracy of transvaginal ultrasound (U/S) criteria in the diagnosis of adenomyosis and to correlate the U/S feature with histopathological results.

**Materials and Methods:** A total of 53 consecutive patients undergoing hysterectomy for adenomyosis were pre-operatively subjected to transvaginal U/S examination in this prospective study. The diagnosis was made if one or more of the following U/S findings were present: (1) A globular uterine contour; (2) poor endometrial-myometrial interface; (3) subendometrial echogenic linear striations; (4) myometrial anterior-posterior asymmetry; (5) myometrial cysts; and (6) a heterogeneous myometrial echotexture. These U/S findings were then compared and confirmed with the histopathological studies.

**Results:** The prevalence of adenomyosis was 23.4%. The sensitivity, specificity, positive predictive value, negative predictive value (NPV), and accuracy of transvaginal U/S for the diagnosis of adenomyosis were 80.5, 58.6, 61.2, 81.8, and 72.4, respectively. Subendometrial echogenic linear striations, a heterogeneous myometrial echotexture, and myometrial anterior-posterior asymmetry showed greater accuracy for the diagnosis of adenomyosis. Subendometrial echogenic linear striations had the best sensitivity, positive predictive value, and NPV for the diagnosis of uterine adenomyosis (89.2, 63.2, and 88.7%, respectively). The presence of a globular uterine configuration was the most specific sonographic feature (74.3%) but showed poor specificity (48.5%).

**Conclusion:** The presence of subendometrial echogenic linear striations, a heterogeneous myometrial echotexture, and myometrial anterior-posterior asymmetry on transvaginal ultrasonography supports the diagnosis of adenomyosis. Among the transvaginal U/S findings consistent with the diagnosis of adenomyosis, subendometrial linear striations had the highest diagnostic accuracy.

**Key words:** Adenomyosis, Histopathological, Linear striation, Transvaginal sonography

## INTRODUCTION

Adenomyosis is a not so uncommon gynecologic disease defined as ectopic endometrial glands and stroma within the uterine myometrium.<sup>1</sup> Patients may present with non-specific symptoms such as dysmenorrhea, dyspareunia, and menometrorrhagia. The plausible mechanism to explain adenomyosis is that it results from down growth

and invagination of the basal layer of endometrium into the myometrium resulting in weakness of the myometrium caused by trauma such as cesarean section, dilatation and curettage, myomectomy, or other uterine surgeries.<sup>2</sup> Adenomyosis is usually diagnosed using transabdominal ultrasonography (TAUS), transvaginal ultrasonography (TVS), or magnetic resonance imaging (MRI). Among these, TAUS has a limited diagnostic value for adenomyosis, whereas TVS has feasible ability to diagnose adenomyosis.<sup>3,4</sup> As compared with MRI, TVS is more cost effective and available.<sup>5-7</sup> Many ultrasound (U/S) features have been described for adenomyosis;<sup>8</sup> they are (1) heterogeneous myometrium; (2) myometrial cysts; (3) subendometrial echogenic linear striations; (4) globular configuration; (5) myometrial anteroposterior asymmetry; and (6) poor

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identification of the endometrial junction. The most specific transvaginal U/S diagnostic feature is a point of discussion. The present study aims to evaluate the accuracy of transvaginal U/S criteria in the diagnosis of adenomyosis and to correlate the U/S feature with histopathological results.

## MATERIALS AND METHODS

A total of 53 consecutive patients attending the Department of Obstetrics and Gynecology of a teaching hospital attached to Kannur Medical College, Anjarakandy, Kannur, Kerala, India, were included in this study. All the patients were undergoing hysterectomy surgery for different diseases. The study period was between June 2011 and May 2014.

### Inclusion Criteria

Patients presenting with dysmenorrhea, menometrorrhagia, cervical intraepithelial neoplasias, adnexal masses, genital prolapse, and endometrial hyperplasia or carcinoma and patients showing U/S features of adenomyosis were included in the study.

### Exclusion Criteria

Patients with invasive type of neoplasias and malignant lymphadenopathy were excluded from the study. A thorough gynecological history was elicited. A TVS was done before surgery. The indications for hysterectomy were TVS examinations which were evaluated using a 7-9 MHz endovaginal probe. A single physician with 5-year experience as a sonologist was employed to all the U/S examinations in the study. U/S examination of the myometrial echotexture, uterine borders (regular or irregular), uterine size, and the presence of associated abnormalities (including leiomyomata) was observed. The diagnostic criteria used in the diagnosis of uterine adenomyosis in this study were one or more of the following criteria on TVS:<sup>1,3,6,8,9</sup> (1) a globular-rounded configuration of the uterus (defined as a regularly enlarged uterus); (2) asymmetry of the anteroposterior wall of the myometrium; (3) poor definition of the endometrial-myometrial junction; (4) myometrial cysts (defined as a round anechoic area with a diameter of 1-7 mm); (5) hyperechoic, subendometrial, echogenic linear striations being located near the endometrial-myometrial interface; and (6) a heterogeneous myometrium (defined by the presence of an indistinctly defined myometrial area with decreased or increased echogenicity). A histopathological examination (HPE) was performed by a pathologist, who was blinded to the U/S findings. Macroscopically, adenomyosis was diagnosed by an enlarged uterus, a globular and/or asymmetrical uterus, and a dense, irregularly fasciculated myometrium with small cavities (0.5-10 mm). The disease

was described as local: Circumscribed nodular lesion and focal: Adenomyosis lesions restricted to one uterine wall. Histopathological features for adenomyosis used in the study were the presence of ectopic endometrial gland or tissue within the myometrium and located 2.5 mm beyond the endometrial-myometrial junction. Grading of adenomyosis was done as 1, 2, and 3 corresponded to the adenomyotic involvement of the inner one-third, two-thirds, and entire myometrium, respectively. Adenomyosis was also graded as mild, moderate, or severe according to the number of endometrial islets observed (1-3, 4-9, and 10 or more foci, respectively). Statistical analysis was performed using online [socialscistatistics.com](http://socialscistatistics.com). Statistical significance was set at  $P < 0.05$ .

## RESULTS

The age group of 53 patients ranged from 26 years to 76 years with a mean age of  $46.40 \pm 4.32$ . Among them, 38 patients (71.69%) were premenopausal and the remaining 15 were (28.30%) postmenopausal. There was no statistically significance in the mean age, gravidity, and parity of the 53 patients. The indications for hysterectomy were dysmenorrheal ( $n = 21$ , menometrorrhagia ( $n = 11$ ), cervical intraepithelial neoplasias ( $n = 05$ ), adnexal masses ( $n = 06$ ), genital prolapse ( $n = 03$ ), and endometrial hyperplasia or carcinoma ( $n = 06$ ). The frequency of clinical symptoms was higher in patients with adenomyosis. The proportion of post-menopausal women with myomas was higher in patients without adenomyosis. Histologic examination showed that the overall prevalence of adenomyosis was 32.07% (17/53). Among them, 11 patients (64.70%) had diffuse adenomyosis and 6 patients (35.29%) had focal adenomyosis. The grades of adenomyosis were 1, 2, and 3 in 2, 5, and 10 cases, respectively. Other disorders with or without adenomyosis were leiomyoma ( $n = 09$ ), cervical intraepithelial neoplasias ( $n = 08$ ), adnexal disease (ovarian cancer and abscesses) ( $n = 06$ ), genital prolapse ( $n = 03$ ), and endometrial hyperplasia or carcinoma ( $n = 10$ ) (Table 1).

Out of 38 patients with negative HPE findings of adenomyosis, 30 showed U/S picture of globular uterine appearance (78.94%); 9/17 of HPE positive for adenomyosis were observed with similar U/S picture (52.94%). Poor differentiation of endometrium on U/S observation was found in 12/17 of the HPE-positive patients for adenomyosis, whereas 15/38 (88.23%) of the negative HPE patients (39.47%). Subendometrial echogenicity was found in 13/17 (76.47%) of the positive and 13/38 (34.21%) of the negative HPE patients. Myometrial anteroposterior asymmetry was found in 10/17 (58.82%) of the HPE positive and 11/38 (28.94%) of the HPE-negative patients in the study (Table 2). Table 2 reveals that when comparing

**Table 1: The patient characteristics with or without adenomyosis (n=53)**

Observation	HPE +ve for adenomyosis-17	HPE -ve for adenomyosis-38	Total	P value
Age	44.30±3.40	48.50±4.20	46.40±4.32	NS
Gravidity	2.40±1.6	2.8±1.3	2.6±1.5	NS
Parity	2.5±1.0	2.2±1.2	2.3±1.9	NS
Dysmenorrhea	15 (88.23%)	9 (23.68%)	24	0.031
Menometrorrhagia	11 (64.70%)	25 (65.78%)	36	0.046
With myomas	4 (23.52%)	17 (44.73%)	21	0.045
Menopausal women	1 (5.88%)	13 (34.21%)	15	0.039

HPE: Histopathological examination

**Table 2: The correlation between U/S findings and HPE findings of the study (n=53)**

Observation	Yes or No	HPE +ve for adenomyosis-17	HPE -ve for adenomyosis- 38	P value
Globular uterine appearance	Yes	9	8	0.08
	No	8	30	
Poor differentiation of endometrium	Yes	12	15	0.15
	No	5	23	
Subendometrial echogenicity	Yes	13	13	0.030
	No	4	25	
Myometrial anteroposterior asymmetry	Yes	10	11	0.046
	No	5	27	

NS: Not significant, U/S: Ultrasound, HPE: Histopathological examination

each sonographic finding of adenomyosis, subendometrial echogenic linear striations, myometrial anterior–posterior asymmetry, and heterogeneous myometrial echotexture had higher statistical significance ( $P < 0.05$ ) than other clinical signs of adenomyosis (Table 2).

## DISCUSSION

Adenomyosis pathologically is a benign disease of the endometrium resulting in invasion and overgrowth into the myometrium (9). The frequency reported in the literature is from 8 to 85%.<sup>1,5,6,9-12</sup> In the present study, the prevalence of adenomyosis was 23.4%. Atri<sup>13</sup> opined that the wide range of this frequency of adenomyosis may be due to the variation in the histologic criteria for its diagnosis, the degree of care with which pathologic specimens are observed, and the number of blocks of sampling specimens taken. In the present study, only four to eight blocks sectioned per specimen. The comparison of the sensitivity, specificity, positive predictive value (PPV), and negative predictive value of our study with the previous studies<sup>5,8,14,15</sup> is shown in Table 3.

The sensitivity and specificity of 80.5 and 58.6, respectively, observed in the present study were comparable with a previous study.<sup>16</sup> It is still debate whether MRI or TVU is the best tool to diagnose uterine adenomyosis. According to Ascher *et al.*,<sup>5</sup> MRI is significantly better than TVU ( $P < 0.02$ ) for diagnosing adenomyosis. However, Reinhold *et al.*<sup>6,10,15</sup> found that TVU was as accurate as MRI in the diagnosis of uterine adenomyosis. Bazot *et al.*<sup>1</sup> suggested that TVU

**Table 3: A comparative study of present with different authors**

Authors	n	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
Siedler <i>et al.</i> <sup>14</sup>	80	63	97	71	-
Fedele <i>et al.</i> <sup>8</sup>	43	80	74	73	81
Ascher <i>et al.</i> <sup>5</sup>	17	52.9	66.6	90	20
Reinhold <i>et al.</i> <sup>16</sup>	100	86	86	71	94
Current study	53	80.5	58.6	61.2	81.8

PPV: Positive predictive value, NPV: Negative predictive value

and MRI have similar accuracy rates for the diagnosis of adenomyosis in the absence of associated disorders. The accuracy of TVU for the diagnosis of adenomyosis could be influenced in part by patient characteristics, such as an enlarged uterus.<sup>3</sup> The variable accuracy of TVU for the diagnosis of adenomyosis may be because of differences in the main diagnostic criteria used. Heterogeneous myometrial echotexture is the major sonographic criteria used in most studies.<sup>5-7,10,12,14</sup> However, Bazot *et al.*<sup>1,3</sup> suggested that myometrial cysts had the highest specificity for adenomyosis. In this retrospective study, it was observed that the subendometrial linear striations had the best specificity and PPV, and this was consistent with the studies of Atri *et al.*<sup>13</sup>

## CONCLUSION

TVU finding of subendometrial echogenic linear striations, a heterogeneous myometrial echotexture, and myometrial anterior-posterior asymmetry has good specificity in the diagnosis of uterine adenomyosis. Among these TVU

findings, subendometrial linear striations had the highest diagnostic accuracy for recognizing adenomyosis, yielding better results than a heterogeneous myometrium.

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