



Role of Transvaginal Sonography and Magnetic Resonance Imaging in Uterine Adenomyosis

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ABSTRACT.

AIM:The aim of the study is to evaluate the contribution of transvaginal sonography (TVS) and magnetic resonance imaging (MRI) for diagnosis and evaluation of adenomyosis.

METHODOLOGY : An Observational, cross sectional study was performed on 50 patients in Department of Radiodiagnosis of Gcs medical college, ahmedabad, in which clinically suspected cases of adenomyosis were included. After obtaining consent, patients were subjected to TVS and MRI scan. TVS was performed using Mindray DC-70 USG machine and MRI Pelvis study was performed on GE 1.5 Tesla machine with dedicated pelvis coil.

RESULT : -The statistical data of TVS diagnosed adenomyosis obtained were 30 true-positive, 4 false-positive, 14 true-negative findings, 2 false negative -yielding 93.75% sensitivity, 77.8 % specificity%, NPV = 88.24 % and PPV = 87.50 %.

- The statistical data of MRI diagnosed adenomyosis obtained were 31 true-positive, 2 false-positive, 16 true-negative findings, 1 false negative -yielding 96.88% sensitivity, 88.89% specificity%, NPV = 93.94% and PPV = 94.12%.

CONCLUSION:TVS due to its efficacy, safety, wide-spread availability, and low cost remains the primary and initial imaging modality for the diagnosis of adenomyosis. MRI, however, should be recommended as the second-line imaging to confirm the TVS findings in suspected patients before subjecting them to any radical procedure as MRI is an accurate, noninvasive and more specific radiological modality to diagnose and evaluate uterine adenomyosis that may be missed, not confirmed or misdiagnosed by ultrasound .

KEYWORDS:MRI, TVS, Adenomyosis

I. INTRODUCTION

Adenomyosis is a common uterine condition of ectopic endometrial tissue in the myometrium. Although most commonly asymptomatic, it may present with menorrhagia, irregular menstruation and dysmenorrhea. (1)

Adenomyosis is usually relatively generalized, affecting large portions of the uterus, but sparing the cervix. Despite often marked enlargement of the uterus, the overall contour is usually preserved. Adenomyosis cannot be accurately diagnosed on clinical criteria alone. Yet, hysterectomy is frequently performed merely on the basis of suspected symptoms. Better preoperative diagnostic tools are required to avoid unnecessary hysterectomy and if possible, to investigate nonsurgical alternatives. Moreover, diagnosis of adenomyosis and its differentiation from leiomyomas before hysteroscopic surgery for abnormal uterine bleeding is essential because uterine-conserving therapy is possible in leiomyoma whereas debilitating adenomyosis only has hysterectomy as definitive treatment. (1)

Several studies have evaluated the accuracy of trans-vaginal ultrasonography (TVS) for the diagnosis of adenomyosis. However, a comprehensive picture of the diagnostic precision of TVS is still lacking because of limited research literature.

Studies have differentiated only between focal adenomyosis and leiomyomas not accounting for diffuse adenomyosis. Magnetic resonance imaging (MRI) has produced promising results in the diagnosis of adenomyosis. The diagnostic potential of MRI and TVS has been compared in limited studies, with conflicting results. This study aims to rectify this situation by evaluating and comparing the diagnostic accuracy of TVS and MRI imaging techniques.



Role of TVS in imaging of adenomyosis :

The sonographic signs of adenomyosis must be diagnosed during the course of dynamic examination.USG should be the first imaging study in the sitting for diagnosis of adenomyosis owing to its availability, efficacy and cost. (1,2)

Diagnostic criteria of uterine adenomyosis include two of the five sonographic features on TVS:

- (1) Loss of distinction of the endometrial-myometrial junction.
- (2) Asymmetry of the anterior and posterior myometrium.
- (3) Subendometrial-myometrial striations.
- (4) Myometrial cysts and fibrosis.
- (5) Heterogeneous myometrial echotexture.

Role of MRI in imaging of adenomyosis :

Although, MRI is not easily feasible or cost effective, it is considered accurate in depicting normal uterine anatomy and a variety of pathologies. T2-weighted images are the most valuable because the zonal anatomy of the uterus is optimally demonstrated. Endometrial fluid, endometrium, junctional zone (JZ) myometrium, outer myometrium, and the surrounding tissues can be readily differentiated. (3)

Following are features of diagnosing Adenomyosis on MRI:

- (1)Junctional zone thickening ≥ 12 mm.
- (2)Maximal JZ thickness to myometrial thickness ratio >40 .
- (3)Difference between the maximum and minimum thickness of JZ >5 mm.
- (4)Myometrial heterogeneous intensity.
- (5)Hyperintense myometrial foci.

II. METHODOLOGY:

An Observational,cross sectional study was performed on 50 patients in Department of Radiodiagnosis of Gcs medical college,ahmedabad, in which clinically suspected cases of adenomyosis were included. After obtaining consent , all the patients were subjected to TVS and MRI scan.TVS was performed using Mindray DC-70 USG machine and MRI Pelvis study was performed on GE 1.5 Tesla machine with dedicated pelvis coil. Adenomyosis was diagnosed with above mentioned imaging features in TVS and MRI. The imaging results were then compared to histopathology findings.

Inclusion Criteria :

- All patients referred to the department of Radiology in whom subsequently TVS and MRI will be done will be included in the study.
- Clinically suspected uterine pathology with presenting symptoms related to adenomyosis which include dysmenorrhoea, menorrhagia, dyspareunia, chronic pelvic pain.

Exclusion Criteria :

- **FOR TVS:**Negative consent from the patient and Unmarried female.
- **FOR MRI :** Implanted electric and electronic devices are a strict contraindication to the magnetic resonance imaging, and in particular:heart pacemakers and metallic implants,(especially older types),insulin pumps,implanted hearing aids,neurostimulators,intracranial metal clips,metallic bodies in the eye and Metal hip replacements(old type), sutures or foreign bodies in other sites are relative contraindications to the MRI.

OBSERVATION:

USG* HPE CROSS-TABULATION				
		HPE DIAGNOSIS OF ADENOMYOSIS		TOTAL
		PRESENT	ABSENT	
USG CONCLUDING ADENOMYOSIS	PRESENT	30	4	34
	ABSENT	2	14	16
TOTAL		32	18	



MRI * HPE CROSS-TABULATION				
		HPE DIAGNOSIS OF ADENOMYOSIS		TOTAL
		PRESENT	ABSENT	
USG CONCLUDING ADENOMYOSIS	PRESENT	31	2	33
	ABSENT	1	16	17
TOTAL		32	18	

	TVS		MRI	
	Frequency	Percentage	Frequency	Percentage
True positive	30	60%	31	62%
False positive	4	8%	2	4%
False negative	2	4%	1	2%
True negative	14	28%	16	32%
Total	50	100%	50	100%

	TVS	MRI
Sensitivity	93.75%	96.88%
Specificity	77.8%	88.89%
PPV	88.24%	93.94%
NPV	87.50%	94.12%

III. STATISTICAL ANALYSIS:

Out of the 4 cases that were false positive on TVS-

- Two of these cases were later diagnosed as leiomyoma on MRI and also had HPE finding conclusive of the findings of leiomyoma as well. This erroneous false positive result on TVS was due to few similar imaging characteristics of leiomyomas with adenomyosis.
- The other 2 were diagnosed on MRI as adenomyosis only, however histopathology was not suggestive of the same, leading to false positive diagnoses on MRI as well Out of 2 false negative results in TVS-
- 1 result which was undiagnosed was the mild diffuse type of adenomyosis in which the TVS imaging features were not very apparent.
- It was then diagnosed in subsequent MRI study.
- The other 1 remained undiagnosed on MRI, to be later confirmed only on histopathology.

The imaging results were compared to histopathology findings with following results:

- The statistical data of TVS diagnosed adenomyosis obtained were 30 true-positive, 4 false-positive, 14 true-negative findings, 2 false negative -yielding 93.75%% sensitivity, 77.8 % specificity%, NPV = 88.24 % and PPV = 87.50 %.
- The statistical data of MRI diagnosed adenomyosis obtained were 31 true-positive, 2 false-positive, 16 true-negative findings, 1 false negative -yielding 96.88%% sensitivity, 88.89% specificity%, NPV = 93.94% and PPV = 94.12%.

IV. IMAGE DISCUSSION:

*TVS images

A 46 year old female patient with complaints of irregular menstrual cycle and heavy menstrual bleeding had changes of adenomyosis on TVS. TVS images Sagittal(A) and Axial (B) section - show mildly bulky uterus with heterogeneous texture in myometrium and loss of endomyometrial junction.



(A)

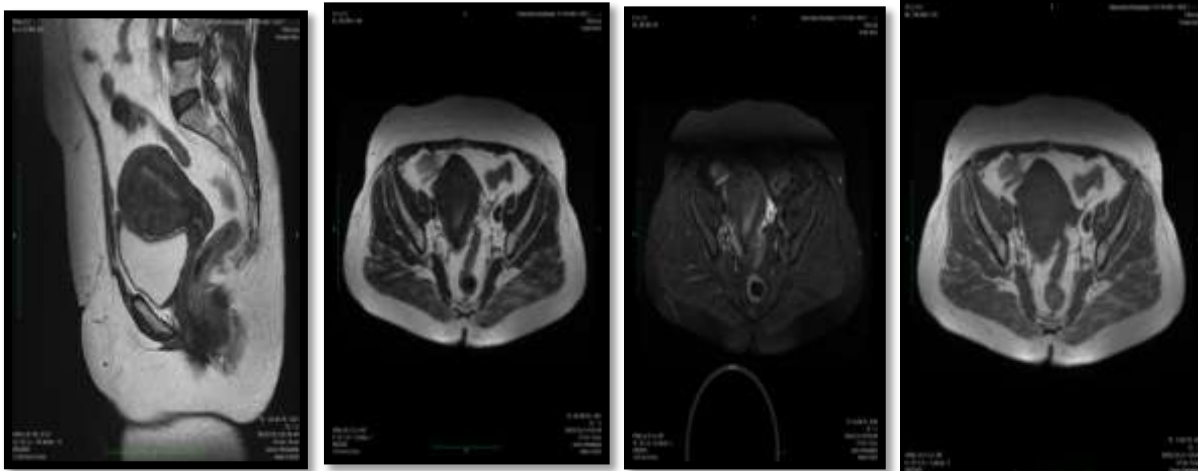
(B)

***MRI Images:**

Uterus appears mildly bulky in size and shows ill defined altered signal intensity areas involving uterine myometrium which appears heterogeneously hyperintense on T2 Weighted Images [Sagittal image (A) and Axial image (B)] and STIR images [Axial image (C)] as shown in T2-giving it a striated appearance, more marked posteriorly.

Thickening of the junctional zone (17 mm) with partial loss of endo-myometrial junction

differentiation is noted in fundal region and anterior myometrium. Focal well defined altered signal intensity lesion of size 32 x 21 mm is noted in fundal region and anterior myometrium of uterus which appears isointense on T1W images [Axial images (D)] and heterogeneously hyperintense on T2 and STIR images [A,B,C]. Findings suggestive of changes of adenomyosis with focal adenomyoma.



(A)

(B)

(C)

(D)

V. DISCUSSION:

In our study, MRI sensitivity was only slightly, but not significantly higher than TVS sensitivity which suggests that MRI and TVS are almost equally good at identifying patients with adenomyosis.

In this study MRI was superior to TVS for the diagnosis of adenomyosis in following terms:

- MRI specificity was significantly higher than

TVS specificity and thus we can deduce that MRI is superior to TVS to exclude the diagnosis of adenomyosis.

-MRI also lessened the number of false negative and false positive results.

Leiomyomas are the most common and elusive differential diagnosis of adenomyoma. Although both adenomyoma and leiomyoma are characterized by low signal intensity on T2W images, adenomyoma presents on



MRI as a poorly defined lesion, with minimal mass effect and some tiny cystic components hyperintense on T2W or T1W sequences. In contrast, leiomyoma typically appears as a well-defined mass often associated with peripheral large vessels, usually not present around the adenomyoma.

Difficulties have also been reported in evaluating adenomyosis when both myomas and adenomyosis were present. Previous reference literature suggests that USG findings were correlated to histopathology during surgery and even severe disease was not diagnosed, when myomas were present. MRI seems to outperform TVS for diagnosis of adenomyosis in the presence of myomas. (4, 5).

Togashi et al., (1989) also found that, making a diagnosis of adenomyosis preoperatively was a difficult task and in most of the cases histopathological examination was essential to confirm the diagnosis. Many authors also believed that it was difficult to differentiate adenomyosis from leiomyoma. However Magnetic Resonance Imaging was found highly accurate in demonstrating uterus abnormalities. In their study spin echo images with long transverse relaxation time demonstrated optimum details of zonal anatomy of uterus. They concluded that MRI was highly sensitive not only in the diagnosis of adenomyosis but also in differentiating adenomyosis from leiomyoma. Magnetic Resonance Imaging played a crucial role in differentiating these lesions preoperatively and was also useful in offering appropriate management. (5)

VI. CONCLUSION:

To conclude, TVS-CD due to its efficacy, safety, wide-spread availability, and low cost remains the primary and initial imaging modality for the diagnosis of adenomyosis. MRI, however, should be recommended as the second-line imaging to confirm the TVS-CD findings in suspected patients before subjecting them to any radical procedure. To conclude, TVS-CD due to its efficacy, safety, wide-spread availability, and low cost remains the primary and initial imaging modality for the diagnosis of adenomyosis. MRI, however, should be recommended as the

second-line imaging to confirm the TVS-CD Findings in suspected patients before subjecting them to any radical procedure or conclude, TVS-CD due to its efficacy, safety, wide-spread availability, and low cost remains the primary a

To conclude, TVS due to its efficacy, safety, wide-spread availability, and low cost remains the primary and initial imaging modality for the diagnosis of adenomyosis. MRI, however, should be recommended as the second-line imaging to confirm the TVS findings in suspected patients before subjecting them to any radical procedure. MRI is an accurate, noninvasive and more specific radiological modality to diagnose and evaluate uterine adenomyosis that may be missed, not confirmed or misdiagnosed by ultrasound.

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