Research Article

ACCURACY OF 2D-TVS IN ADENOMYOSIS DIAGNOSIS

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ARTICLE INFO	ABSTRACT

Adenomyosis is benign debilitating disease of endometrium. It presents with non-specific clinical features like chronic pelvic pain, dysmenorrhea and heavy menstrual blood loss. Diagnosis of adenomyosis with non-invasive tools like ultrasound and magnetic resonance imaging (MRI) are available. Pre op diagnosis helps in proper management of symptoms. There is debate regarding accuracy of these tools. Ultrasound is an inexpensive and readily available tool as compared to MRI. Histopathology of uterine specimen is gold standard for adenomyosis confirmation.

Material and Methods: Cross sectional study carried out in tertiary care hospital. One hundred and thirty three cases with non- specific clinical features of adenomyosis were included in study. These cases underwent 2-D transvaginal ultrasound and later on hysterectomy. Histopathology of Uterine specimen used for final confirmation of 2D-TVS diagnosis of adenomyosis.

Results: Out of 133 women 38 were diagnosed as cases of adenomyosis on 2D-TVS. On histopathology 30 (True Positive) were confirmed and 8 were not found to have adenomyosis (False Positive). Out of 95 cases with no feature of adenomyosison 2D-TVS 2 (False Negatine) were found cases of adenomyosis on histopathology. Validity of 2D-TVS for adenomyosis diagnosis taking histopathology as gold standard is sensitivity 93.8%, specificity 92.1%, PPV 78.9%, NPV 97.9% and accuracy 92.5%.

Conclusion:2D-TVS have strong validity for pre op diagnosis of adenomyosis.

INTRODUCTION

Adenomyosis is benign disease of the endometrium with the invasion into the myometrium and overgrowth[1]. Patients with adenomyosis may have non-specific clinical symptoms like pelvic pain, dysmenorrhea, heavy menstrual bleeding and infertility[2,3]. A globular uterus from diffuse uterine enlargement is a common finding on physical examination. Exact pathogenesis of adenomyosis is unknown although commonly proposed theories include direct invasion of the endometrium into the myometrium or embryologic mis-placed pluripotent mullerian remnants[3].

The reported prevalence of adenomyosis ranges from 1-70% with a mean of 20-35%[2,4]. Its most commonly seen in women aged 40-50 years[5,6]. Diagnosis of adenomyosis on clinical ground is challenging as symptoms are nonspecific as well as it usually exhibits co-morbidity with other gynecological conditions such as leiomyoma, endometriosis and endometrial

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polyp that can present with similar symptoms[3,7]. These conditions have different treatment options and accurate diagnosis is, therefore critical for determining appropriate medical or surgical management[8]. There is growing body of evidence to support the use of several emerging therapeutic approaches. Treatment of adenomyosis varies widely from simple medication to a total hysterectomy and several options in between[9].

Recent advances in imaging techniques have had an impact on the detection of uterine adenomyosis such as transuterine sonography (TUS), transvaginal sonography (TVS) and magnetic resonant imaging (MRI). These techniques allowed non- invasive diagnosis of adenomyosis[10, 11,12]. The preoperative diagnosis of adenomyosis was first started with TUS. However, adenomyosis could not be reliably differentiated from leiomyoma on TUS despite high specificity(97-97.5%) but low sensitivity(30-63%) due to its limited image resolution[10]. TVS is better in specificity and sensitivity (60.1 -87.1%) in diagnosis of adenomyosis[13]. Ascher *et al*[14] recommended MRI as significantly better tool than TVS(p<0.02) for diagnosing adenomyosis. however, Reinhold *et al* [15,16] found that TVS as accurate as MRI in the diagnosis of uterine adenomyosis[11].

There is debate that best non- invasive diagnostic tool for adenomyosis is TVS or MRI.

Ultrasound imaging being widely available and relatively inexpensive is considered better option. We decided therefore to find out validity of TVS by taking histopathology of uterine specimen as gold standard.

Rationale

To limit the utilization of MRI in the pre-op diagnosis of adenomyosis, being very expensive, not widely and readily available, requires prepration and cannot carried out in office setting.

MATERIALS AND METHODS

Cross sectional study carried out at Dr Ruth Km Pfau Civil Hospital Karachi (tertiary care hospital) from 20-11-2019 to 20-5-2020. All women between 30-50 years presenting in gynae OPD for pelvic pain, dysmenorrhea or heavy menstrual bleeding (HMB) and later on decided for hysterectomy were selected for study. All of them underwent 2D-TVS for diagnosis of adenomyosis. Cases of leiomyoma, endometrial polyp and endometriosis were excluded from study. Those 133 cases included for study having following features on 2D-TVS were labeled cases of adenomyosis.

1. Enlarged globular uterus.
2. Presence of cystic spaces of 2-7 mm (corresponding to cystic or hemorrhagic glands i-e heterogeneous echotexture and thickened endometrium.
3. Thickened transformation zone.

These 133 women later on underwent total abdominal hysterectomy and uterine specimen sent for histopathology. Histopathologic examination was carried out by pathologist unaware of sonographic findings. All pathologic abnormalities macroscopic and microscopic were recorded. Macroscopically, enlarged uterus, a globular/ asymmetrical uterus. Microscopically, presence of an ectopic endometrial gland or tissue within the myometrium and located 2.5 mm beyond the endometrial myometrial junction.

and histopathology. Mean SD was calculated for age. Two by two table used to calculate sensitivity, specificity, positive predictive value(PPV), negative predictive value(NPV) and diagnostic accuracy of TVS by taking histopathology as gold standard.

RESULTS

Recruited 133 women underwent 2D-TVS and then histopathology of uterine sample after hysterectomy. Mean age 40.77±5.94 and prevalence of adenomyosis is 24.1 %(32/133) on histopathology reference. Out of 133 women 38 (28.57%) had 2D-TVS findings of adenomyosis. Out of these 38 women 30 (78.94%) had confirmed adenomyosis on histopathology (8 False Positive) out of 133 women 95(77.5%) had no features of adenomyosis on 2D-TVS. Out of these 95 cases 2 (2.1 %) had adenomyosis on histopathology (2 false negative). So 2D-TVS yielded 38 cases of adenomyosis and 30 cases proved on histopathogy and 2D-TVS negative for adenomyosis in 95 cases but 2 cases had adenomyosis on histopathology.

Table 1 shows sensitivity, specificity, PPV, NPV is 93.8%, 92.1%, 78.9% and 97.9% respectively and diagnostic accuracy is 92.5%.

Table 1 Validity of 2D-TVS Test

Sensitivity	93.8%
Specificity	92.1%
PPV	78.9%
NPV	97.9%
Accuracy	92.5%

PPV= Positive predictive value
NPV=Negative predictive value

Table 2 shows correlation between clinical symptoms and histopathologic adenomyosis. Out of histopathologically proven 32 cases 22(68.75 %) had pelvic pain and 10(31.25 %) had no pelvic pain, 19 (59.37 %) had dysmenorrhea and 13(40.62 %) had no dysmenorrhea, 24 (75 %) had HMB and 8 (25 %) had

no HMB.

Table 2 Correlation between clinical and Histologic Adenomyosis:

Clinical adenomyosis		N=32 Histologic adenomyosis	%	N=101 Histologic No adenomyosis	%	N=133 total	%
Pelvic pain	Yes	22	68.7	86	85.1	108	81.2
	No	10	32.2	15	14.8	25	24.7
Dysmenorrhea	Yes	19	59.3	81	80.1	100	75.1
	No	13	40.6	20	19.8	33	24.8
Heavy menstrual bleeding	Yes	24	75	79	77.2	102	76.6
	No	08	25	23	22.8	31	23.3

Sample size

From study by Lin Naing, by keeping the diagnostic parameters as sensitivity 86% and specificity 96%, margin of error sensitivity 11%, specificity 4% prevalence 30%[17].

Sampling technique

Non probability consective sampling technique. After taking ethical approval from DUHS research department and college of physician and surgeons Pakistan. Data was analyzed using SPSS version 23, frequency and percentages was calculated for symptoms of adenomyosis and finding of adenomyosis on TVS

DISCUSSION

Adenomyosis is a common and debilitating disease for millions of women[18]. In our study prevalence is 24.1%with very authentic reference of histopathology. Reported frequency of adenomyosis is 1-70%[2,4]. Prevalence of 39.9% (85/213) observed in one study[13] while in other study its 48.5%, which could be due to standard of reference is MRI instead gold standard histopathology of uterine specimen. Their criteria of selection was high clinical suspicion rule out adenomyosis on MRI[8]. According to Azziz[1]wide range of prevalence values probably due to different standard of reference, different

pathology criteria and the degree of care with which specimen are observed, and the number of blocks of sampling taken. Studies found adenomyosis prevalence high in women aged 40-50 years[18]. We found mean age of 40.77±5.49. Other studies also observed adenomyosis in women in their late reproductive life[19,20].

Selection criteria of cases for study was pelvic pain, dysmenorrhea and HMB and 2D-TVS chosen for baseline sonography. We have selected 2D-TVS as tool of choice for pre op diagnosis of adenomyosis because studies are in favor of 2D-TVS accuracy and found around 29% prevalence of adenomyosis both by 2D-TVS and 3D-TVS[21] and concluded that accuracy of 2D-TVS and 3D-TVS is similar. Currently there is no general agreement on the most useful sonographic findings for diagnosing adenomyosis[22]. Our selected sonographic criteria for adenomyosis are reliable being studied and approved in many studies [13,15]. One study showed validity of few diagnostic sonographic findings. In this study subendometrial echogenic linear striations are most reliable followed by hetrogenous myometrium while in other study by Reinhold *et al* [15] with 25 pathologically confirmed cases of adenomyosis heterogenous myometrium ± cyst is the most reliable sonogrphic feature for adenomyosis diagnosis. Heterogenous myometrium echotexture is the most common sonographic feature for adenomyosis in many studies[14,15,23]One of our criteria for labeling adenomyosis is heterogenous myometrium and presence of 2-7 mm cystic spaces similar to these studies. However, Bazol *et al*[10,24] suggested myometrial cyst had the highest specificity and another study suggested linear striation had the best specificity and PPV[13] and concluded along with sub endometrial echogenic linear striations, heterogenous myometrial echotexture and myometrial anterior posterior asymmetry had higher statistical significance($p<0.05$) than other sonographic features of adenomyosis. These differences of sonographic criteria effects accuracy of diagnosing adenomyosis and so patients management. Since most of the time patients management is often based on importance of a uniform, reproduce able, clinically relevant reporting system for ultrasound findings of adenomyosis.

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Selected clinical presentation of adenomyosis and confirmed cases of adenomyosis on histopathology is shown in table II. Out of 32 confirmed cases of adenomyosis 22 i-e 22/32 (68.75%) had pelvic pain, 24/32 (75%) had HMB and 19/32 (59.37%) had dysmenorrhea. In one study[13] frequency of confirmed cases of adenomyosis on histopathology were 85 and out of it 82 had dysmenorrhea(96.5%) and 128 with no adenomyosis on histopathology 37 had pelvic pain(30%) , they also observed menomtrorrhagea in 61/85 (71.8%) confirmed cases of adenomyosis on histpathology and 52/128(40.65%) with no adenomyosis found on histopathology. One other study [18] concluded that cases presenting with menometrorrhagea 68.1 % had chance of later on confirmed adenomyosis. These clinical criteria are likely to have adenomyosis as we observed in our study and found in other studies.

2D-TVS yields diagnosis of adenomyosis in 38 out of 133 cases(28.57 %) and 30 (78.94 %)of them also confirmed on histopathology (i-e 8 FP) and out of 95 (71.42%) cases excluded for adenomyosis on 2D-TVS 2(2.1%) cases had adenomyosis (i-e 2 FN). One study found out of 213 cases of adenomyosis 85(39.9%) cases confirmed on histopathology i-e 51 FP cases and 128(60.09%)cases had no adenomyosis on

histopathology i-e 11 FN. Validity of 2D-TVS in our study i-e, sensitivity, specificity, PPV, NPV and accuracy as 93.75%, 92%, 78.9%, 97.9% and 92.5% respectively (table I).Comparable results obsereved in one study regarding validity of 2D-TVS showing, sensitivity, specificity, PPV, NPV and overall accuracy is 87.1%, 60.1%, 52.9%, 87.5% and 87.1% respectively[13]and KepKep *et al* found its 80.8%, 61.1%, 55.3%, 84.4%[25]

CONCLUSION

In conclusion , our study suggested that the 2D-TVS findings of enlarged, globular uterus, heterogenous and thickened myometrium have strong validity in diagnosing adenomyosis.
Preoperative use of sonography as diagnostic tool of adenomyosis is cost effective, minimal invasive, ease of use and its wide availability makes it most practical tool.
Preop adenomyosis diagnosis with minimal invasive tool may lead to gynecologist to offer definitive surgery when appropriate, earlier in patients course of care.

Main differential diagnosis of adenomyosis is the association with uterine leiomyoma, it's one of the main limitation of TVS.

Our strength of study is its prospective study and standard of reference for confirmation of sonography findings in diagnosing adenomyosis is uterine specimen histopathology rather MRI.

Its hospital based study and number of cases studied are not adequate. Study in group of centers and adequate sample size should be carried out

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