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### Original Article

## Recognizing the Spectrum of Sonographic Presentations of Adenomyosis in the Peri-Menopausal Women Underwent Hysterectomy

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### ABSTRACT

**Background:** Adenomyosis is a non-malignant infiltration of endometrial tissue into the myometrium, resulting in a globular uterus. It typically diminishes after menopause. Thus, it is rarely reported in post-menopausal women. Clinically, it is difficult to be differentiated from other gynecological conditions (e.g., Fibroid). Pelvic ultrasound can be aid the clinician to reach diagnosis. However, there is no universally accepted classification system specific for diagnosis. The current work aimed to explore the spectrum of sonographic findings detected in peri-menopausal women that treated by hysterectomy.

**Materials and Methods:** This retrospective study comprised 42 female patients underwent hysterectomy as definitive treatment for their gynecological illness. The post-operative specimens proved the diagnosis of adenomyosis. The study conducted at Al-Azhar university hospital New Damietta, Egypt at the period from January 2019 to December 2020. Revision of medical records for history (e.g., symptoms, contraceptive use, operations and general medical disorders). It also included, the recorded abdominal and pelvic examinations and the findings of sonographic evaluations.

**Results:** The patient's age ranged between 45 and 70 years. Of who 57.14% were pre-menopausal while 42.86% were postmenopausal. The clinical presentation included chronic pelvic pain, menstrual irregularities, inter-menstrual bleeding, post-menopausal bleeding, dysmenorrhea, dyspareunia and history of infertility. History of Hormonal treatment was positive in 21.43%. The ultrasound examinations revealed bulky globular uterus (50%), diffusely inhomogeneous myometrium (64.29%), scattered hyperechoic foci/striations within myometrium (33.33%), scattered myometrial minute cysts and/or hypoechoic striations (45%), abnormal junctional zone (40.48%), focal adenomyoma (35.71%) and asymmetry in uterine wall thick ness (14.19 %). Associated findings including, non-neoplastic thickened endometrium (14.29%), fibroids (19.05%) and non-neoplastic adnexal cysts (26.19%).

**Conclusion:** The adenomyosis is non-expected at advanced age. However, if present, it can be identified accurately by a competent ultrasound examination.

**Keywords:** Hysterectomy; Adenomyosis; Ultrasound; Fibroid.



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## INTRODUCTION

Adenomyosis was initially described in 1860 as abnormal presence of endometrial tissue within the myometrium (1). Later, the modern definition of adenomyosis characterized it as the non-malignant infiltration of endometrial tissue into the myometrium, resulting in a globular uterus with microscopic features showing displaced, non-cancerous endometrial glands and stroma encased by hypertrophic and hyperplastic myometrium. This condition may manifest as either diffuse or cystic, with diffuse presentation being more prevalent (2).

Adenomyosis typically diminishes after menopause, making its occurrence in post-menopausal women rare (3). Identifying adenomyosis clinically can pose difficulties, considering that patients may exhibit various general gynecological symptoms like persistent pelvic pain, heavy and/or irregular menstruation, dysmenorrhea, infertility and dyspareunia (4). Moreover, distinguishing adenomyosis from other gynecological conditions, such as fibroids, can be challenging, and adding complexity to determining the root cause of patients' symptoms (5).

Due to the non-specific nature of adenomyosis symptoms, clinicians commonly utilize pelvic ultrasound or even magnetic resonance imaging to assist in diagnosis. While imaging is crucial for diagnosis, there is no universally accepted classification system specifically tailored for diagnosing adenomyosis using either imaging modality (4).

**The work aiming** to explore the spectrum of sonographic findings detected in peri-menopausal women that treated by hysterectomy for their chronic gynecologic illness & their uterine specimens proven by histopathology to have adenomyosis.

## MATERIALS AND METHODES

This was a retrospective observational study. It was carried out at Al-Azhar University Hospital (Damietta), Egypt. It was performed from January 2019 to December 2020.

### **Inclusion criteria:**

Ladies in peri-menopausal stages of life that underwent hysterectomy to treat gynecologic problems with definite histopathological manifestation of adenomyosis. The included ladies must have medical files containing complete clinical data & pre-operative trans-vaginal ultrasound. The ultrasound examination must be performed by a senior radiologist expert in

female imaging.

On the other side, we excluded ladies with evidence of malignant neoplasms, or with negative histopathological results or diagnosis other than adenomyosis. In addition, ladies younger than 45 years of age were excluded.

### **Methods**

Medical records that contain complete data were checked for the date of medical history (e.g., chronic pelvic pain, menstrual irregularities, abnormal bleeding, contraceptive or hormone use, history of operations or general medical disorders). In addition, data about abdominal and pelvic examinations & routine laboratory investigations were also revised and documented. As all the participants underwent preoperative trans abdominal & trans-vaginal ultrasound performed (2-7 days) prior to surgery conducted at radiology department utilizing real time ultrasound machine (Accuvix XG, Samsung Medison co., Korea 2018), which is equipped with endocavitary probe (Endo Cavity ER4-9/10-ED) as well as abdominal curved probe (C2-8 convex probe 2-8 MHz).

Full reports were explored including uterine, cervical, ovarian, adnexal and parametrial pelvic structures. The findings were recorded and documented.

The histologic examination was performed by a pathologist who was blinded to the preoperative ultrasound. Tissue specimens were picked from the anterior and posterior uterine walls. The presence of endometrial glands and/or stroma greater than one high-power field deep to the endometrial-myometrial junction were used as diagnostic criteria of adenomyosis.

### **Ethical approval**

The internal ethics board decided that an approval is not necessary due to the retrospective data collection design of the study. However, administration approval was approved. The collected data were anonymized to conceal patient identity and only used for the purpose of research.

## RESULTS

The study included 42 female patient. The diagnosis of adenomyosis was confirmed by histopathology after hysterectomy. The age of included patients ranged between 45 and 70 years. The mean (SD) age was 54.8 (6.97). Twenty four women (57.14%) were pre-menopausal while 18 women

(42.86%) were post-menopausal. The clinical presentation of participants included chronic pelvic pain, menstrual irregularities, inter-menstrual bleeding, post-menopausal bleeding, dysmenorrhea, dyspareunia and history of infertility (Table 1).

The medical history of the participant women included hypertension (9.52%), diabetes mellitus (16.67%) and variable degrees of obesity in 11.63%. Surgical history was positive for cholecystectomy (11.9%), appendectomy (7.14%). History of Hormonal treatment was positive in 21.43%. The laboratory profiles of study population which had conducted within 3 days prior to hysterectomy were positive for mild anemia in 23.81%, dyslipidemia (21.43%), hyperuricemia (9.52%) with no positive history of bleeding disorders or thyroid dysfunction. The clinical examination was positive for bulky tender uterus (12-14 weeks in bimanual examination) in 12 patients (28.57%) (Table 1).

The ultrasound manifestations included bulky globular uterus (50%), diffuse inhomogeneous echo-texture of myometrium (64.29%), scattered hyperechoic foci/striations within myometrium (33.33%), scattered myometrium minute cysts (their diameters are less than 2 mm) and/or hypoechoic striations (45%), abnormal sonographic appearance of innermost layer of myometrium which called junctional zone (JZ) (40.48%), focal myometrial lesion suggestive of adenoma (35.71%) and asymmetry in uterine wall thickness (14.19 %). Associated findings also included uniformly thickened endometrium with negative smears for atypical cells (14.29%), fibroids with different locations (19.05%) and non-neoplastic adnexal cysts including simple, hemorrhagic & chocolate cysts (26.19%).

Figures (1) to (4) represented ultrasound findings of some cases.

**Table 1: Clinical symptoms and comorbid medical conditions among study population**

		Frequency	percentage
<b>Clinical symptoms</b>	Chronic pelvic pain	28	66.67%
	Dysmenorrhea	23	54.76%
	Dyspareunia	9	21.43 %
	Menstrual irregularities	15	35.71%
	Inter-menstrual bleeding	9	21.43%
	Post-menopausal bleeding	12	28.57%
	History of hormonal treatment for infertility	8	19.05 %
<b>Comorbid conditions</b>	hypertension	7	9.52%
	Diabetes mellitus	6	16.67%
	obesity	5	11.63 %
	Hormonal treatment	9	21.43%
	Anemia (mild)	10	23.81
	dyslipidemia	9	21.43%
	hyperuricemia	4	9.52%

**Table (2): The ultrasound findings of patient's preoperative pelvic ultrasound**

Ultrasound findings	Number of patients	percentage
inhomogeneous myometrium	27	64.29%
Bulky globular uterus	21	50.00%
scattered minute cysts / hypoechoic striations	19	45.24%
Abnormal Junctional zone	17	40.48%
Focal adenomyoma	15	35.71%
scattered hyperechoic foci / striations	14	33.33%
Asymmetric thickness of uterine walls	14	33.33%
fibroids	8	19.05%
Thickened endometrium	6	14.29%
Adnexal non-neoplastic cysts	11	26.19%



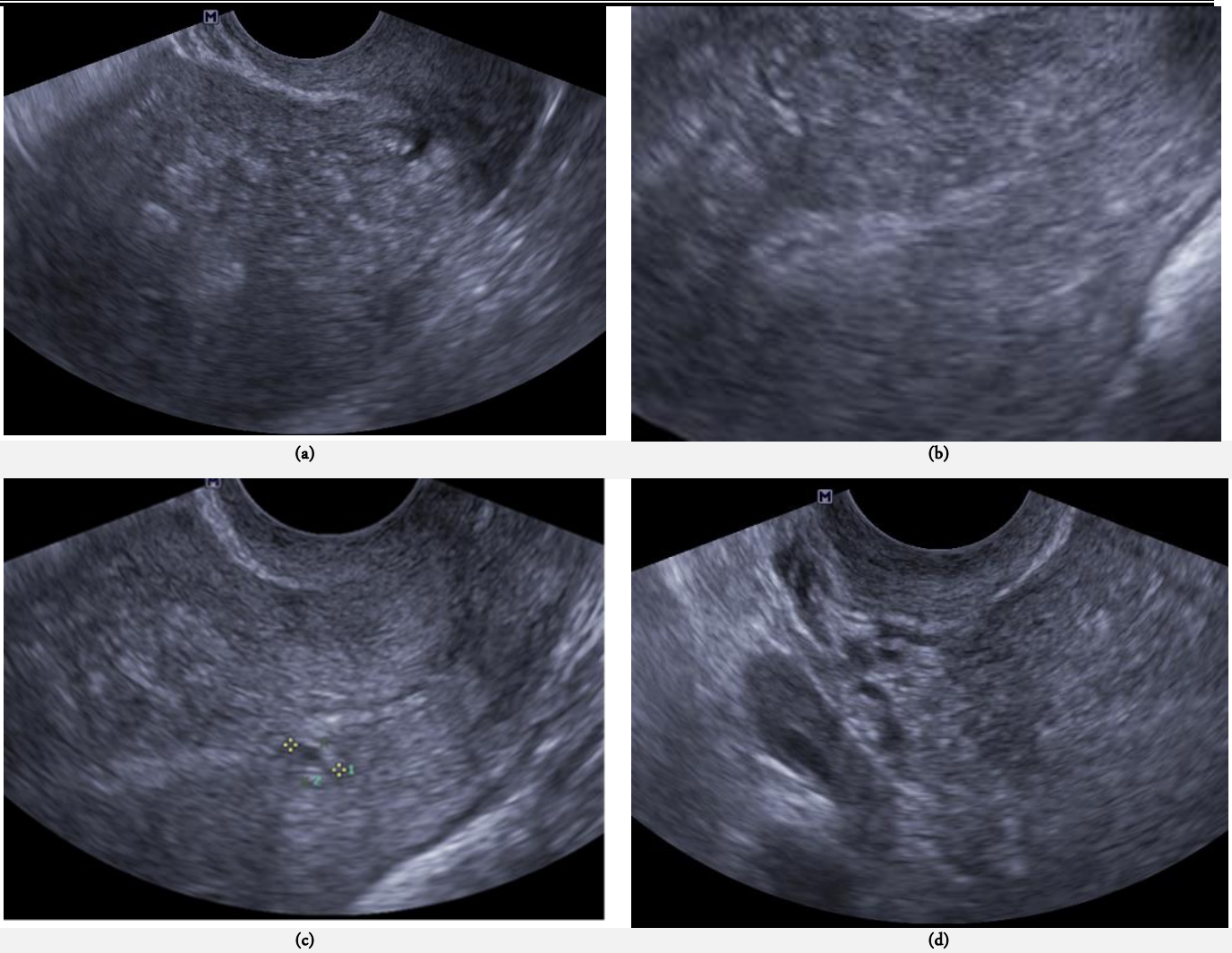


Figure (1) presented ultrasound of female patient, 55 years old. The TVUS showed (a) myometrial inhomogeneous echopattern with multiple tiny hyperechoic foci seen distributed diffusely within myometrium, (b) Interrupted transional (junctional) zone, (c) focal adenomyoma, (d) small size (atrophied) ovary with no focal lesions.

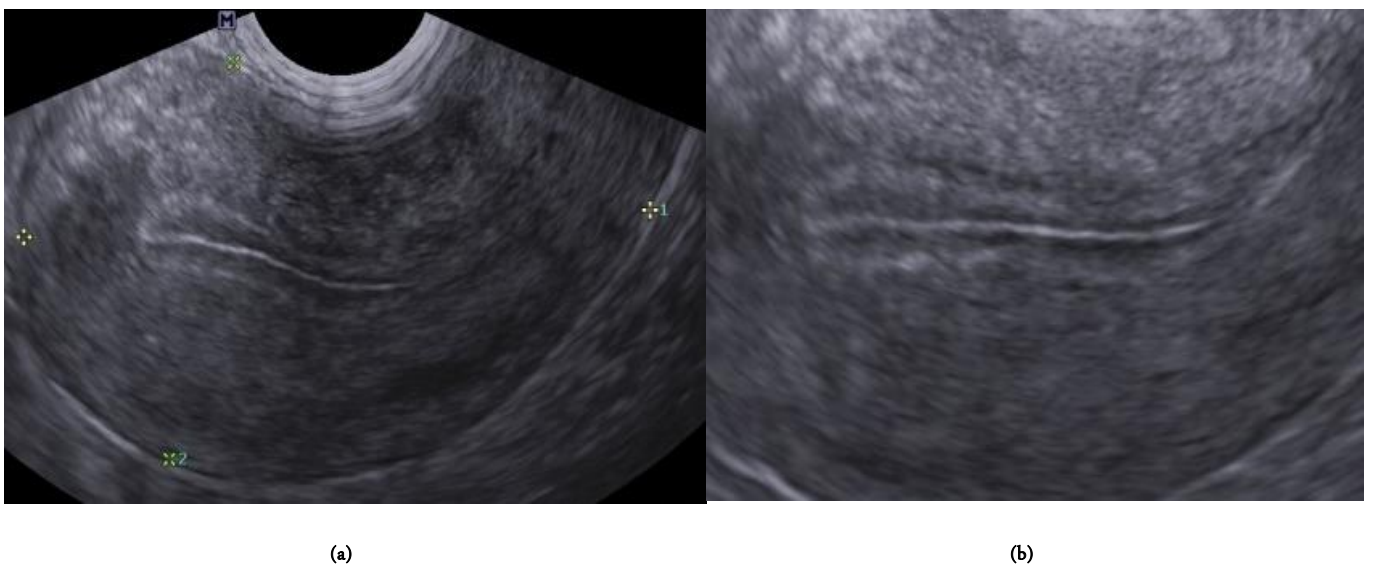


Figure (2) of female patient 48 years old. TVUS showed (a) inhomogeneous echopattern with multiple tiny hyperechoic islands seen distributed diffusely within myometrium (b) interrupted junctional zone.

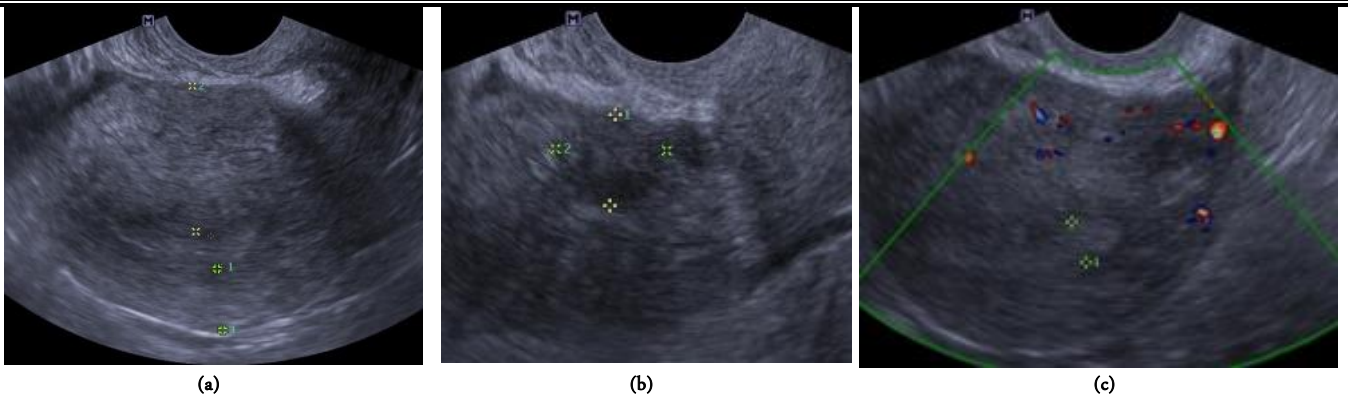


Figure (3) of female patient 51 years old. The TVUS showed (a) asymmetry between uterine walls with thickened anterior wall (b) focal adenomyoma (c) inhomogeneous myometrial echopattern with increased vascularity. in this cases ovaries were atrophied

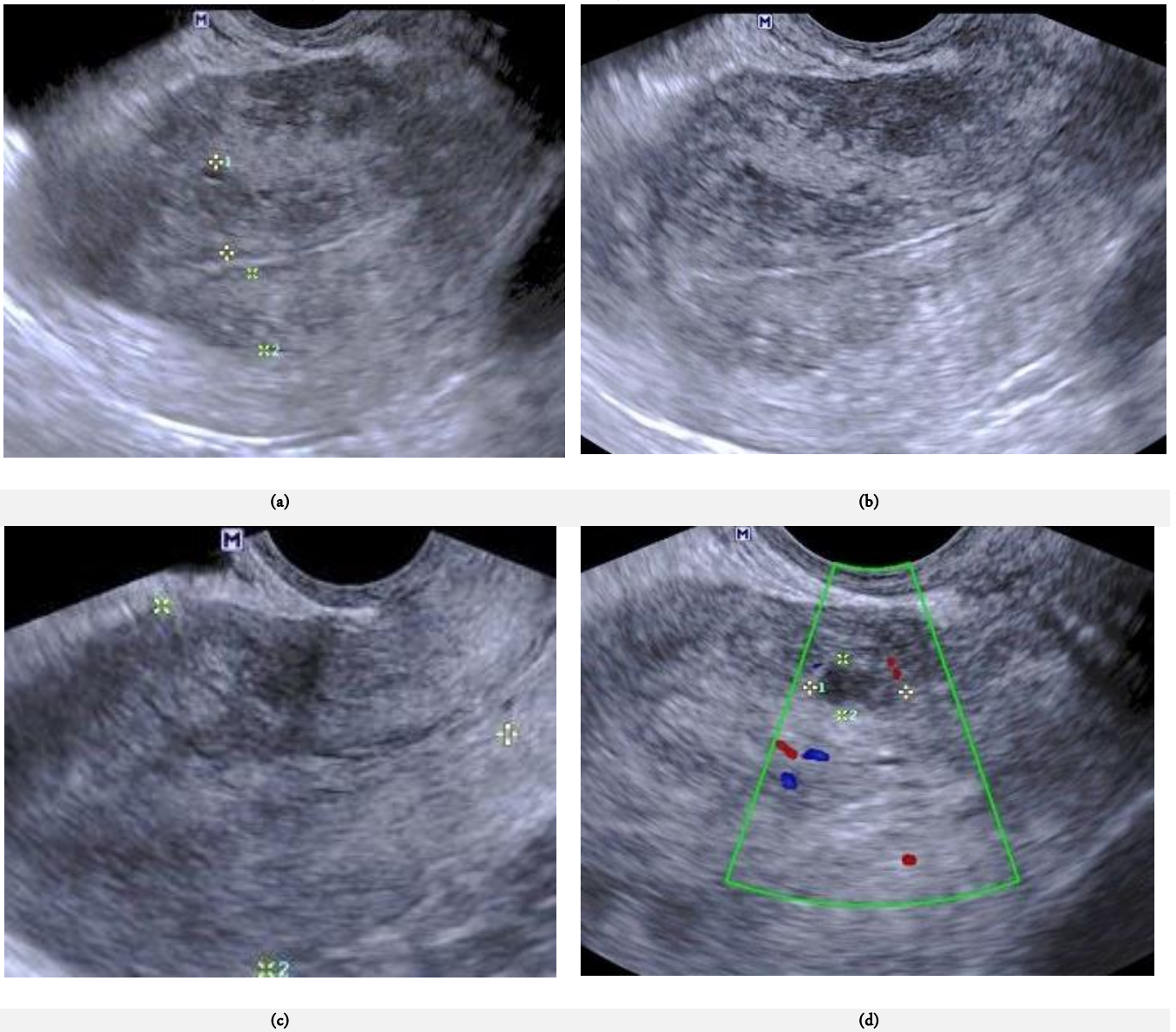


Figure (4): of female patient 60 years old. The TVUS shows (a) thickened junctional zone between endometrium & myometrium specially at fundal region (b) multiple tiny hypoechoic (cystic) foci seen (c) linear hypoechoic striations (d) focal cystic adenomyoma.

## DISCUSSION

The identification of adenomyosis in young women who are suffering from infertility, pain or abnormal uterine bleeding has been increased in the epidemiological status of the diseases (6).

As menopause come to reproductive cycle, the drop of estrogen level occurs, resulting in obvious changes to female genital tract including decreased uterine and ovarian sizes, endometrial thickness and number of follicle-like cystic structures (7).

Adenomyosis regresses after menopause, so its detection in postmenopausal women is rare with variability in reported incidence ranging from 0.49% to 9% (3,8).

During our work in investigating females at late reproductive age or in postmenopausal period who were suffering from many gynecological symptoms (e.g., abnormal bleeding & chronic pain), we found that a sizable group of them their illness could be only interpreted by the presence of adenomyosis. Hence the importance of the study.

The clinical presentations & symptomatology of adenomyosis patients compromise wide range of non-specific items which carry equal chances to be or not to be caused by adenomyosis (9).

In our study, variety of presenting symptoms were recorded with the different types of pelvic pain in front of the list (chronic pelvic pain (66.67%), dysmenorrhea (54.76%) and dyspareunia (21.43 %), followed by the abnormal uterine bleeding (AUB) (menstrual irregularities (35.71%), inter-menstrual bleeding (21.43%), and post-menstrual bleeding (28.57%) and the history of impaired fertility (19.05%). These presentations makes clinical picture susceptible for many interpretations and attributions to different pathologies that are sharing in generation of these symptoms. This is concordant with published data by different authors (10-13).

These studies agreed with us not only in symptoms type & distribution but also in the non-pathognomonic nature of these presentation as other co-existing morbidities may participate in illness generation (13).

In our study, the investigated group are totally symptomatic which is different from other published data that found a

significant percent of asymptomatic adenomyosis (9). This could be interpreted by social and cultural aspects of our patients that prevent them from taking decision of hysterectomy except in extreme conditions.

The clinical examination in symptomatic patient may help in raising suspicion of the disease as we found in the studied group that 28.75% have enlarged tender uterus but also this is not enough alone for diagnosis and considered by the current researchers and others (14) as added point in the way of diagnosis which should followed by another more specifying tool.

The advances achieved in imaging techniques has allowed trusted precise diagnosis of adenomyosis could lead treatment without need to invasive tissue diagnosis (15, 16).

Our experience tells that, the pelvic ultrasound examination is very beneficial tool in diagnosing adenomyosis as it compromise many unique features, being widely available, relatively not expensive and enabling dynamic viewing of the female pelvis whether trans-abdominally or endo-vaginally to get the best results at different situations. The ultrasound when used by expert personnel aware by different sonographic signs of adenomyosis as well as other gynecological illness can give strong evidence of uterine involvement by adenomyosis.

Some authors recently considered trans-vaginal ultrasound is the first-line diagnostic technique for adenomyosis, while the more advanced MRI, have a role in limited situations (17).

Although the access of trans-abdominal ultrasound to pelvic organs naturally is limited by anatomical obstacles making it of little diagnostic value (18). In our experience it has valuable role in diagnosing some issues (e.g., some adnexal & fundal diseases) when the trans-vaginal rout can't reach them.

In the current work, inhomogeneous myometrium comes at the top of list of frequently detected sonographic signs (64.29%) followed by bulky globular uterus (50%).

The enlarged uterus is the first described sonographic sign of adenomyosis as early as 1986 but with poor accuracy (19). Later on, the sonographic diagnosis become established by detecting ill-defined myometrial heterogeneity (20).

The items sharing in heterogeneity including altered echopattern, decreased or increased, presence of myometrial



cysts, which were correlated to histopathologic appearance. Thus, become the basis of establishing diagnosis of adenomyosis <sup>(21,22)</sup>.

In our work, 45.24% of participants showed myometrial minute cysts or linear hypoechoic striations and 33.33% showed hyperechoic foci/ striations which used as strong signs suggesting the disease in radiological pre-operative reports.

Another sign used in disease suggestion was the alteration in junctional zone (JZ) appearance as they may be interrupted, ill-defined or significantly thickened which was found in 40.48% of cases. The detection of JZ abnormalities has achieved increased role in establishment of diagnosing adenomyosis. Irregular endometrial–myometrial interface, poor definition and thickening of the JZ were described as signs of endometrial migration into myometrium <sup>(23)</sup>.

With advancement in 3D ultrasound capabilities, TV3D ultrasound can easily visualize JZ, assessing lateral and fundal sides of JZ and clearly visualize endometrial protrusions into the myometrium in original & reformatted coronal planes <sup>(24, 25)</sup>.

Another sign could be noticed in adenomyosis, a muscular hypertrophy which was detected by asymmetrical myometrial walls <sup>(23)</sup>.

In our study, we detected this sign in 33.3% of cases with posterior wall as the dominant site for thickening. The morphological uterus sonographic assessment (MUSA) consensus instruct the examiner to start with 2D measurements of the uterine anterior and posterior uterine walls in sagittal plane. MUSA considered an asymmetry of uterine walls thickness is a sonographic feature of possible adenomyosis when the ratio is above or below one <sup>(26)</sup>.

Lastly, the focal adenomyoma, which is appeared as focal myometrial lesion with indistinct borders, in contrast to fibroid and may be partially cystic was noticed in 35.71% of study cases. The difficulty is encountered when these lesions are concomitant with uterine fibroids. Presence of adnexal endometriosis with focal adenomyoma strengthen the suggestion of adenomyosis <sup>(27, 28)</sup>.

The strength of this study comes from being based on firm histopathologic diagnosis from tissue wall samples. The use of the widely available tool the conventional 2D ultrasound and

focusing on a group of patients away from interest because their advanced stage of life makes presence of adenomyosis unexpected. The limitations starts from the relatively small number of participants, the descriptive nature of data analysis and non-exploration of other more accurate tools like three dimensional TVUS and MRI.

Directing the efforts of further research to utilize these advanced imaging tools may help in reduction of hysterectomies by more definition and localization of disease extent.

**Conclusion:** although the adenomyosis is non-expected at advanced stages of life it could be identified accurately by a competent ultrasound examination conducted by expert personnel aware of its sonographic presentations which will be reflected on patient treatment outcome.

Conflict of Interest: None

Financial disclosure: None

## REFERENCES

1. Cucinella G, Billone V, Pitruzzella I, Lo Monte AI, Palumbo VD, Perino A. Adenomyotic cyst in a 25-year-old woman: case report. *J Minim Invasive Gynecol.* 2013;20(6):894-8. doi: 10.1016/j.jmig.2013.04.022.
2. Wang PH, Su WH, Sheu BC, Liu WM. Adenomyosis and its variance: adenomyoma and female fertility. *Taiwan J Obstet Gynecol.* 2009;48(3):232-8. doi: 10.1016/S1028-4559(09)60295-3.
3. Upson K, Missmer SA. Epidemiology of Adenomyosis. *Semin Reprod Med.* 2020 May; 38(2-03):89-107. doi: 10.1055/s-0040-1718920.
4. Di Donato N, Montanari G, Benfenati A, Leonardi D, Bertoldo V, Monti G, Raimondo D, Seracchioli R. Prevalence of adenomyosis in women undergoing surgery for endometriosis. *Eur J Obstet Gynecol Reprod Biol.* 2014; 181:289-93. doi: 10.1016/j.ejogrb.2014.08.016.
5. Garcia L, Isaacson K. Adenomyosis: review of the literature. *J Minim Invasive Gynecol.* 2011 Jul-Aug;18(4):428-37. doi: 10.1016/j.jmig.2011.04.004.
6. Naftalin J, Hoo W, Pateman K, Mavrellos D, Foo X, Jurkovic D. Is adenomyosis associated with menorrhagia? *Hum Reprod.* 2014 Mar;29(3):473-9. doi: 10.1093/humrep/det451.
7. Sokalska A, Valentin L. Changes in ultrasound morphology of the uterus and ovaries during the menopausal transition and early postmenopause: a 4-year longitudinal study. *Ultrasound Obstet Gynecol.* 2008 Feb;31(2):210-7. doi: 10.1002/uog.5241.
8. Shaikh H, Khan KS. Adenomyosis in Pakistani women: four year experience at the Aga Khan University Medical Centre, Karachi. *J Clin Pathol.* 1990 Oct; 43(10):817-9. doi: 10.1136/jcp.43.10.817.

9. Peric H, Fraser IS. The symptomatology of adenomyosis. *Best Pract Res Clin Obstet Gynaecol.* 2006 Aug;20(4):547-55. doi: 10.1016/j.bpobgyn.2006.01.006.
10. Lippman SA, Warner M, Samuels S, Olive D, Vercellini P, Eskenazi B. Uterine fibroids and gynecologic pain symptoms in a population-based study. *Fertil Steril.* 2003 Dec; 80(6):1488-94. doi: 10.1016/s0015-0282(03)02207-6.
11. Munro MG, Critchley HO, Broder MS, Fraser IS; FIGO Working Group on Menstrual Disorders. FIGO classification system (PALM-COEIN) for causes of abnormal uterine bleeding in nongravid women of reproductive age. *Int J Gynaecol Obstet.* 2011 Apr; 113(1):3-13. doi: 10.1016/j.ijgo.2010.11.011.
12. Gordts S, Grimbizis G, Campo R. Symptoms and classification of uterine adenomyosis, including the place of hysteroscopy in diagnosis. *Fertil Steril.* 2018 Mar; 109(3):380-388.e1. doi: 10.1016/j.fertnstert.2018.01.006.
13. Brucker SY, Huebner M, Wallwiener M, Stewart EA, Ebersoll S, Schoenfish B, Taran FA. Clinical characteristics indicating adenomyosis coexisting with leiomyomas: a retrospective, questionnaire-based study. *Fertil Steril.* 2014 Jan; 101(1):237-241.e1. doi: 10.1016/j.fertnstert.2013.09.038.
14. Krentel H, Cezar C, Becker S, Di Spiezio Sardo A, Tanos V, Wallwiener M, De Wilde RL. From Clinical Symptoms to MR Imaging: Diagnostic Steps in Adenomyosis. *Biomed Res Int.* 2017; 2017:1514029. doi: 10.1155/2017/1514029.
15. Dueholm M, Lundorf E. Transvaginal ultrasound or MRI for diagnosis of adenomyosis. *Curr Opin Obstet Gynecol.* 2007 Dec; 19(6):505-12. doi: 10.1097/GCO.0b013e3282f1bf00.
16. Vannuccini S, Luisi S, Tosti C, Sorbi F, Petraglia F. Role of medical therapy in the management of uterine adenomyosis. *Fertil Steril.* 2018 Mar; 109(3):398-405. doi: 10.1016/j.fertnstert.2018.01.013.
17. Andres MP, Borrelli GM, Ribeiro J, Baracat EC, Abrão MS, Kho RM. Transvaginal Ultrasound for the Diagnosis of Adenomyosis: Systematic Review and Meta-Analysis. *J Minim Invasive Gynecol.* 2018 Feb;25(2):257-264. doi: 10.1016/j.jmig.2017.08.653.
18. Bazot M, Daraï E, Rouger J, Detchev R, Cortez A, Uzan S. Limitations of transvaginal sonography for the diagnosis of adenomyosis, with histopathological correlation. *Ultrasound Obstet Gynecol.* 2002 Dec; 20(6): 605-11. doi: 10.1046/j.1469-0705.2002.00852.x.
19. Murao F, Hata K, Shin K, Hata T, Yoshino K, Yamamoto K, Takahashi K, Kitao M. Ultrasonography for the diagnosis of adenomyosis. *Nihon Sanka Fujinka Gakkai Zasshi.* 1986 Nov; 38(11):2073-7. PMID: 3540155.
20. Brosens JJ, de Souza NM, Barker FG, Paraschos T, Winston RM. Endovaginal ultrasonography in the diagnosis of adenomyosis uteri: identifying the predictive characteristics. *Br J Obstet Gynaecol.* 1995 Jun; 102(6):471-4. doi: 10.1111/j.1471-0528.1995.tb11320.x.
21. Vercellini P, Cortesi I, De Giorgi O, Merlo D, Carinelli SG, Crosignani PG. Transvaginal ultrasonography versus uterine needle biopsy in the diagnosis of diffuse adenomyosis. *Hum Reprod.* 1998 Oct; 13(10):2884-7. doi: 10.1093/humrep/13.10.2884.
22. Reinhold C, Tafazoli F, Mehio A, Wang L, Atri M, Siegelman ES, Rohoman L. Uterine adenomyosis: endovaginal US and MR imaging features with histopathologic correlation. *Radiographics.* 1999 Oct;19 Spec No:S147-60. doi: 10.1148/radiographics.19.suppl\_1.g99oc13s147.
23. Levy G, Dehaene A, Laurent N, Lernout M, Collinet P, Lucot JP, Lions C, Poncet E. An update on adenomyosis. *Diagn Interv Imaging.* 2013 Jan; 94(1):3-25. doi: 10.1016/j.diii.2012.10.012.
24. Exacoustos C, Manganaro L, Zupi E. Imaging for the evaluation of endometriosis and adenomyosis. *Best Pract Res Clin Obstet Gynaecol.* 2014;28(5):655-81. doi: 10.1016/j.bpobgyn.2014.04.010.
25. Senturk LM, Imamoglu M. Adenomyosis: what is new? *Womens Health (Lond).* 2015 Aug; 11(5):717-24. doi: 10.2217/whe.15.60.
26. Van den Bosch T, Dueholm M, Leone FP, Valentin L, Rasmussen CK, Votino A, et al. Terms, definitions and measurements to describe sonographic features of myometrium and uterine masses: a consensus opinion from the Morphological Uterus Sonographic Assessment (MUSA) group. *Ultrasound Obstet Gynecol.* 2015 Sep; 46(3):284-98. doi: 10.1002/uog.14806.
27. Umutlu L, Antoch G, Herrmann K, Grueneisen J. PET/MR Imaging of the Female Pelvis. *Semin Nucl Med.* 2019 Nov;49(6):512-520. doi: 10.1053/j.semnuclmed.2019.06.013. Epub 2019 Jul 16. PMID: 31630735.
28. Langer JE, Dinsmore BJ. Computed tomographic evaluation of benign and inflammatory disorders of the female pelvis. *Radiol Clin North Am.* 1992 Jul; 30(4):831-42. PMID: 1631288.

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