SJ IMPACT FACTOR: 2.912 CRDEEP Journals
Global Journal of Current Research Rashed et. al., Vol. 6 No. 3 ISSN: 2320-2920
Global Journal of Current Research Vol. 6 No. 3. 2018. Pp. 94-102

Full Length Research Paper

Evaluation of Endometrial Volume and Endometrial Thickness by Ultrasound in Comparison to Histological Finding in AUB

Rashed Mohamed Rashed[1], Ehab Mohamed Elhelw[2] and Ahmed Samara Yossef Ahmed[3]

[1.] *Professor of Obstetrics and Gynecology, Al- Azhar University-Egypt.*
[2.] *Assistant Professor of Obstetrics and Gynecology, Al- Azhar University-Egypt.*
[3.] *Resident of Obstetrics and Gynecology, Al- Azhar University-Egypt.*

Article history:
Received: 22-11-2018
Revised: 25-11-2018
Accepted: 28-11-2018
Published: 29-11-2018

Corresponding Author:
Rashed M. Rashed

Abstract

Background: Abnormal uterine bleeding (AUB) is one of most common presenting complaints encountered in a Gynecologists office and accounts for almost 10% consultations in any busy outpatient clinic. AUB is defined as "bleeding that is excessive or occurs outside of normal cyclic menstruation" and accounts for two-thirds of hysterectomies. Because of its broad range of differential diagnosis, the diagnosis of AUB can be quite challenging; despite a detailed history, various blood tests, and a thorough pelvic examination often involving transvaginal ultrasonography (TVS), the cause of the bleeding is established in only 50-60% of the cases (Munro et al., 2011).The cause of bleeding could be often discovered using simple methods, such as gynecological examination (injuries of vulva and vagina, vaginitis) and speculum examination (pathology of cervix). As a noninvasive method, the transvaginal ultrasound represents the following diagnostic tool, which has low specificity and sensitivity in diagnosis of the cause of bleeding (Breijer et al., 2010). Aim of the work: is to assess the value of endometrial volume and endometrial thickness measurements in comparison to the histological finding in differentiating between benign and malignant endometrial pathology in women with abnormal uterine bleeding. Patients and methods: This study was a prospective observational study that included 50 patients complaining of perimenopausal and postmenopausal bleeding from the outpatient clinic of Al-Azhar University hospital (New Damietta) during the period from 1 December 2017 to the end of July 2018. Results: The endometrial thickness was not significant in patients with abnormal uterine bleeding. Conclusions: The use of 3D volume measurement might be used better to characterize endometrial changes in women with perimenopausal and postmenopausal bleeding.

Keywords: *Endometrial Volume- Endometrial Thickness- Ultrasound - AUB*

Introduction

Abnormal uterine bleeding (AUB) is one of most common presenting complaints encountered in a Gynecologists office and accounts for almost 10% consultations in any busy outpatient clinic. AUB is defined as"bleeding that is excessive or occurs outside of normal cyclic menstruation" and accounts for two-thirds of hysterectomies. Because of its broad range of differential diagnosis, the diagnosis of AUB can be quite challenging; despite a detailed history, various blood tests, and a thorough pelvic examination often involving transvaginal ultrasonography (TVS), the cause of the bleeding is established in only 50-60% of the cases (Munro et al., 2011).

The international federation of Gynecology and Obstetrics working group on menstrual disorders has recently developed a classification system (PALM-COEIN) for causes of the AUB in non-gravid women of reproductive age. There are nine main categories, which are arranged according to the acronym PALM-COEIN: polyp; adenomyosis; leiomyoma; malignancy and hyperplasia; coagulopathy; ovulatory dysfunction; endometrial; iatrogenic; and not yet classified. According to proposed classification system, non-specific term like dysfunctional uterine bleeding should be abandoned to favor a more specific etiology like ovulatory dysfunction (Munro et al., 2011).

Perimenopausal bleeding (PMB) occurred in 409 per 1,000 person-years. In the first year immediately after menopause. When more than 3 years elapsed, the rate plummeted to 42 per 1,000 person-years. Endometrial cancer is the most common genital female malignancy, accounting for nearly half of all new cases of genital cancer. The probability of endometrial cancer in women presenting with PMB is approximately 5-15%, and the lifetime risk of being diagnosed with the disease is 2.7% (Eitan et al., 2005).

Transvaginal ultrasound may include the type of abnormality seen within the endometrium – for example, endometrial hyperplasia, polyps, or carcinoma. Classically, endometrial hyperplasia affects the entire endometrium and results in widening of the endometrium. The endometrial hyperplasia has a cystic lace-like appearance on ultrasound. Endometrial polyps manifest as focal areas of endometrial thickening, and the stalk of the polyp may be seen if sufficient fluid is present in the endometrial cavity. Endometrial carcinoma may occur in the form of a polyp, within endometrial hyperplasia,or as a heterogeneous endometrial mass with a widened irregular cavity (Bradley and Skaznik-Wikiel, 2008).

3DUS allowed performing more precise anatomical sections for exploring the endometrial cavity, the relation of myoma and their possible encroachment on the endometrial cavity, the diagnosis of endometrial polyps and the measurement of endometrial volume rather than the thickness in cases of AUB is now being under investigations and preliminary results seems encouraging. The challenges of major differences in various 3DUS imaging approaches come from specific method used to locate the position of the 2DUS image within the tissue volume under investigation. This procedure performed in correlation with the histology results. The histology was normal in (62%) of the patients; (17.9%) had an endometrial polyp; hyperplasia with or without atypia was found in (12.5%) and carcinoma was found in (7.6%).(Kotdawala et al., 2013).

Aim of the work

The aim of this study is to assess the value of endometrial volume and endometrial thickness measurements in comparison to the histological finding in differentiating between benign and malignant endometrial pathology in women with abnormal uterine bleeding.

Patients and methods

This study was a prospective observational study that included 50 patients complaining of perimenopausal and postmenopausal bleeding from the outpatient clinic of Al-Azhar University hospital (New Damietta) during the period from the 1st of December 2017 to the end of July 2018 participated after oral and informed consent with the following criteria:

Inclusion criteria:

- Post-menopausal bleeding which defined as bleeding after absence of menstrual periods for 1 year. The average age of menopause is 51 years, but the normal range is 45 years to 55 years.
- Peri-menopausal bleeding which defined as bleeding aroundmenopause (Age 40- 50 years having any pattern of bleeding e.g., menorrhagia, metrorhagia, menometrorrhgia for more than 3 months).

Exclusion criteria:

- Patients who were taking hormone replacement therapy or other hormonal preparations with a known effect on the endometrium.
- Current or suspected pregnancy.
- Vaginal atrophy in postmenopausal women.
- Evident Vulval or cervical cause of bleeding.
- Evident general cause that can cause vaginal bleeding such as thyroid disorders, liver disease, and hypertension or drug intake that can lead to vaginal bleeding such as anticoagulant.
- Having any pathological lesion that distorts the endometrium eg. septum and subseptate uterus.

All patients underwent the following:

- ✓ Complete personal history, family history, medical history and general examination.
- ✓ Abdominal and Pelvic examination should include thorough inspection of the vagina, vaginal fornices, vulva, vaginal vault and urethra for lesions.
- ✓ Hemoglobin is needed to determine degree of anemia.
- ✓ All women were examined trans-vaginally in the lithotomy position and empty bladder.
- ✓ After B-mode evaluation was complete, a 2-dimensional ultrasound was activated to assess the myometrium and endometrium.The endometrium should be measured in the long axis or sagittal plane, ideally on transvaginal scanning, with the entirety of the endometrial lining through to the endocervical canal in view. The measurement is of the thickest echogenic area from one basal endometrial interface across the endometrial canal to the other basal surface. Care should be taken not to include hypoechoic myometrium or intrauterine fluid in this measurement.
- ✓ Next, a 3-dimensional box was activated to obtain a 3-dimensional volume from the uterus. VOCAL imaging program was used for all patients to measure endometrial volume. A longitudinal view of the uterus was obtained and “Volume Analysis” on the touch panel was selected, and then VOCAL was selected. “Reference Image: A” was activated. The endometrium was adjusted to fit within green arrows and manually traced by using trackball/pointer. For a valid trace, the trace pointer had to cross the rotation axis line twice. The pointer was moved to the edge of the endometrium and then moved to a new area to be traced. Six traces were drawn by rotating at 30°. Sequence was repeated for all traces. On the final trace, “Done” and then “Accept Region of Interest (ROI)” were selected to obtain endometrial volume in milliliters.
- ✓ Within 1 week after the ultrasound all patients underwent endometrial sampling by hysteroscopic or office biopsy or hysterectomy.

- ✓ Definitive histologic diagnosis was obtained in all cases. Benign histologic findings included cystic atrophy, endometrial polyp, submucousmyoma, and endometrial hyperplasia. Malignant histologic findings included endometrial cancer.

Ultrasound examinations and analysis of ultrasound images and videotapes

- Ultrasonography: ultrasound scan was performed using a Voluson 730 Pro machine (USA) Ultrasound Division, Japan) equipped with a 6.5 MHz transvaginal transducer.
- The examinations were stored digitally on an internal disk drive for subsequent measurements in virtual organ computer-aided analysis (VOCAL) program.

VOCAL is the combination of 3D ultrasound tissue presented as voxels and geometric information of surfaces in a 3D data set. It is defined by rotating an image plane around a fixed axis and defining the 2D contours of each plane. In the 730 system, there are four rotation angles to choose from, namely, 6°, 9°, 15°, and 30°, and because the entire data set is rotated about 180°, these result in 30, 20, 12, and 6 planes, respectively, being available for measurements.The 2D contours of the polygonal area in each plane can be defined automatically or manually. Measurements can be done in three different planes (A, B, and C). In this study, A plane, the longitudinal view, was used.

Statistical Analysis of Data:

The collected data was organized, tabulated and statistically analyzed using statistical package for social sciences (SPSS) version 23 (SPSS Inc, Chicago, USA). For qualitative data, frequency and percent distributions will be calculated. For quantitative data, mean and standard deviation (SD) was calculated. Statistical significance was defined as P value < 0.05.

Results

This study was a prospective study that included 50 patients complaining of perimenopausal and postmenopausal bleeding from the outpatient clinic of Al-Azhar University hospital (New Damietta) during the period from the 1st of December 2017 to the end of July 2018. In the present study, the mean age was 48.7 ± 4.37 years, mean parity was 3.08 ± 1.25 and mean BMI was 29.12 ± 1.46 kg/m^2.

Table 1: Demographic data of the studied group

Parameters	Mean	SD	Minimum	Maximum
Age (years)	48.7	4.37	41	**56**
Parity (number)	3.08	1.25	1	**5**
BMI (kg/m^2)	29.12	1.46	26.4	**31.5**

In the present work, the most common bleeding patterns were post-menopausal in 42%, menorrhagia in 30%, metrorrhagia in 14%, meno-metrorrhagia in 10% and polymenorrhea in 4%.

Table 2: Most common bleeding patterns of the studied cases.

Parameters	Number	Percentage
Post-menopausal	21	**42**
Menorrhagia	15	**30**
Metrorrhagia	7	**14**
Meno-metrorrhagia	5	**10**
polymenorrhea	2	**4**

Table 3: Comparison between severity of bleeding and the hemoglobin.

Degree of bleeding:	Hemoglobin(gm/dl)
Mild	12.7±2.2
Moderate	12.5±1.61
Severe	9.68±2.3
p-value	**.001 (s)**

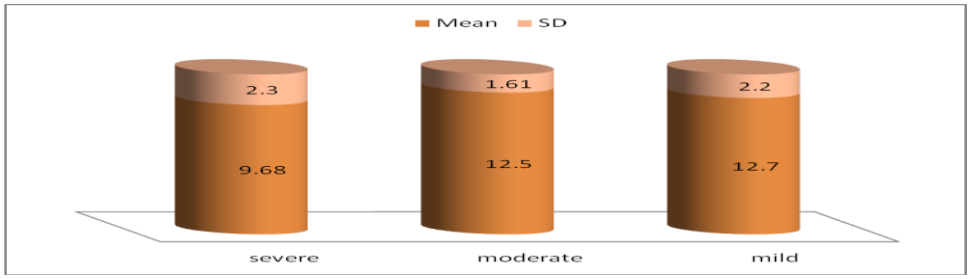

Fig 1: Comparison between severity of bleeding and the hemoglobin

The mean hemoglobin was 11.98±2.12 gm/dl. When we compared between the severity of bleeding and hemoglobin we found there are significant with each other (.001). There were 38% of the studied women suffered from first attack of bleeding and 62% suffered from recurrent attack of bleeding.

Table 4: Attacks of bleeding among our study.

Parameters	Number	Percentage
First attack of bleeding	**19**	**38**
Recurrent attack	**31**	**62**

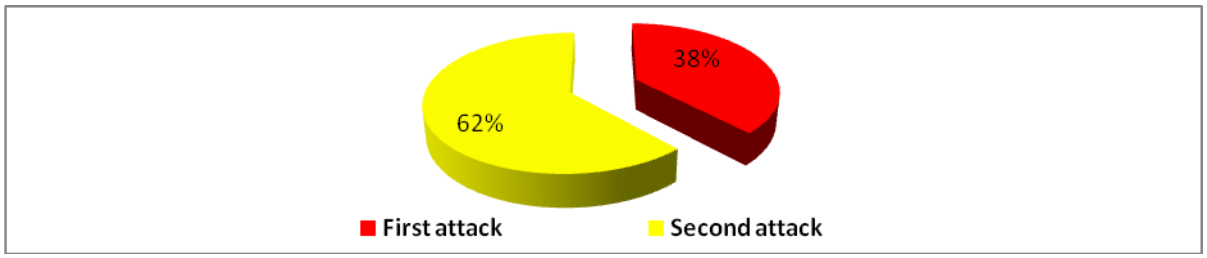

Fig 2: Attacks of bleeding among our study

Table 5: Distribution of medical disorders among the study group.

Items	No. of cases	Percent
Hypertension	11	22%
DM	4	8%
DM/HTN	3	6%
Normal	32	64%

In the present study, the pelvic examination were normal sized uterus in 46% of cases, normal size uterus/endocervical polyp in 16% of cases, enlarged uterus in 26% of cases, enlarged uterus/endocervical polyp in 8% of cases and enlarged uterus with palpable mass in 4% of cases.

Table 6: Pelvic examination of the studied cases

Parameters	Number	Percentage
Normal sized uterus	23	**46**
Normal sized uterus / endocervical polyp	8	**16**
Enlarged uterus	13	**26**
Enlarged uterus / endocervical polyp	4	**8**
Enlarged uterus with palpable mass	2	**4**

All patients were subjected to 2D/3D transvaginal ultrasonographic evaluation of the endometrial thickness and volume; the results were compared to the histopathological examination of the endometrium.

Table 7: Endometrial volume among the study group

Endometrial pathology	CYSTIC atrophy	Endometrial polyp	Simple endometrial hyperplasia	Adenocarcinoma	Disordered proliferative	P- value
Mean endometrial volume/cm³	3.1±2.9	9.8±11.5	3.5±1.8	19.8±7.9	4.8±3.8	0.001(HS)

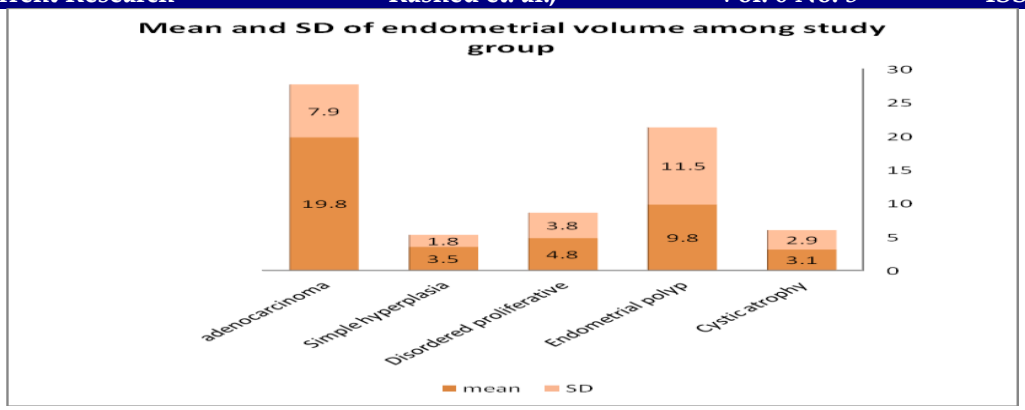

Fig 3: Mean and SD of endometrial volume among study group

Table 8: Endometrial thickness among the study group.

Endometrial pathology	Cystic atrophy	Endometrial polyp	Simple endometrial hyperplasia	Adenocarcinoma	Disordered proliferative	P- value
Mean endometrial thickness/mm	4.5±3.5	12.9±9.7	10.7±4.9	15.9±8.3	10.7±4.4	0.313(NS)

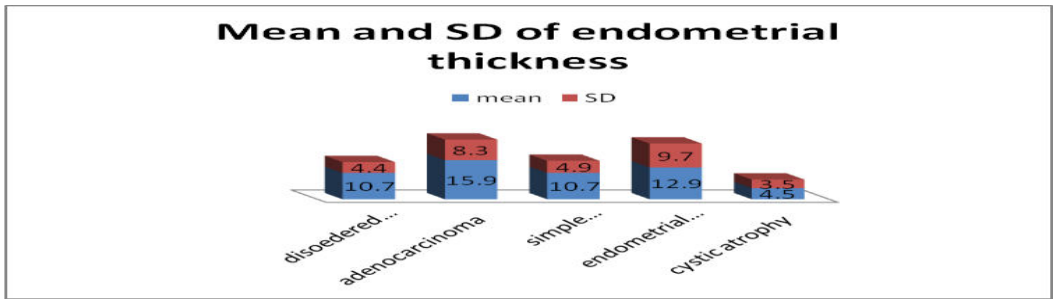

Fig 4: Mean and SD of endometrial thickness

Table 9: Endometrial thickness and volume in patients with normal endometrium (atrophic and proliferative), benign pathology (hyperplasia and polyps) and endometrial cancer.

	Normal	Abnormal	significance	Benign pathology	Malignant pathology	Significance
Volume(cm³)	3.15±1.5	5.01±2.3	0.04 (S)	4.4±1.9	19.8±7.9	.000(HS)
Thickness(mm)	9.1±4.8	12.4±7.5	0.253(NS)	11.6±7.2	15.9±8.3	0.25(NS)

Endometrial thickness and volume in patients with normal or atrophic endometrium, hyperplasia or polyp and cancer are shown in **table (11)**. In patients with cancer the mean endometrial thickness/mm 15.9±8.3 and the mean endometrial volume/cm³ was 19.8±7.9. The endometrial volume was significantly higher in patients with malignant pathology. The endometrial thickness was not significant in patients with abnormal uterine bleeding. In the present study, the ultrasound finding was fibroid in 7 cases (14%), hyperplasia in 17 cases (34%), adenomyosis in 5 cases (10%) and polyp in 6 cases (12%).

Table 9: Ultra-sound finding of the studied cases.

Parameters	Number	Percentage
Normal	7	**14**
Fibroid	17	**34**
Endometrial thickness	15	**30**
Adenomyosis	5	**10**
Polyp	6	**12**

Table 10: Pathological samplings among study group.

Items	No	Percent
Fractional curettage	20	40%
Hysterectomy	25	50%
Hysteroscopy	5	10%

In the present study, the histo-pathological finding were cystic changes in 3 cases (6%), disordered proliferative in 9 cases (18%), endometrial polyp in 13 cases (26%), endometrial hyperplasia in 20 cases (40%), malignancy in 5 cases (10%).

Table 11: Frequency and Percentage of endometrial histopathology among study group.

Endometrial pathology:	Number	Percent
Cystic atrophy	3	6%
Endometrial polyp	13	26%
Disordered proliferative	9	18%
Simple hyperplasia	20	40%
Adenocarcinoma	5	10%

Table 12: Comparison between age values of studied groups in relation to histopathology.

Endometrial pathology	Cystic atrophy	Endometrial polyp	Disordered proliferative	Simple hyperplasia	Adenocarcinoma	P-value
Ages	46±8.4	51.4±9.1	43.8±4.4	48.9±4.4	58.5±7.0	.007(s)

Discussion

Abnormal uterine bleeding is defined as any deviation from the normal menstrual cycle this include change in regularity, frequency of menses, duration or amount of bleeding during or in between periods. AUB is responsible for 20-30% of patient who attend gynaec outpatient department amongst women in reproductive age group and 50% in a perimenopausal women and significantly impacting quality of life and imposing financial burden (Choudhary et al., 2017). Transvaginal sonography (TVS) has permitted the use of higher frequency ultrasound waves at greater proximity of the uterus. It is relatively cheap, needing no anaesthesia, is non-invasive and can be the first diagnostic step in the evaluation of AUB (Nazim et al., 2013). TVS is an important diagnostic parameter in detecting structural causes of AUB such as fibroids, polyps, pelvic mass or endometrial hyperplasia (Cho et al., 2013). Moreover, endometrial sampling for histo-pathological evaluation is needed especially in premenopausal or postmenopausal period for the differential diagnosis of AUB (Abid et al., 2014). An endometrial biopsy is a safe and efficient office-based procedure for sampling the endometrium in a patient presenting with abnormal uterine bleeding. The endometrial tissue obtained provides a diagnosis for wide range of morphologic patterns, normal and abnormal changes like hyperplasia, exogenous hormonal effects, infections, carcinoma which helps in further management (Parmar and Desai, 2016). To evaluate endometrial thickness by 2D ultrasound and endometrial volume by 3D ultrasound in comparison by histopathology and if those diagnostic methods could predict malignant conditions and benign conditions of the endometrium. All the selected patient had underwent general examination, local pelvic examination, transvaginal 2D pelvic ultrasound, 3D endometrial volume measurement and then dilatation and curettage (D&C) or hystroscopic guided biopsy or hysterectomy for focal endometrial lesions and pathological examination of the specimens obtained.

In the present study, the mean age was 48.7 ± 4.37 years, mean parity was 3.08 ± 1.25 and mean BMI was 29.12 ± 1.46 kg/m^2. These results agree with Clark et al. (2002) who done their work on women with mean age 50 years and Stachowiczet al. (2002) noticed the mean age in women with AUB was 53 ± 5 years and in the study by Ahmad et al. (2012) the mean age was 49.4 ± 1.22years. Odeh et al. (2007) reported the mean parity was 3.55 ± 2.21 and in the study byShokouhi (2015) the mean parity was 3.12 ± 1.6. Azim et al. (2011) and Khan et al. (2011) reported a higher incidence of AUB with increase in parity. Sajitha et al. (2014) reported body mass index (BMI) was found to be significantly higher in women with endometrial hyperplasia. Of the 39 patients with hyperplasia, 10.2% were found to be obese and 30.76% were overweight. In obese women, there is an increased risk of endometrial hyperplasia (EH) and endometrial carcinoma which can be explained by the increased availability of peripheral estrogens as a result of aromatization of androgens to estrogens in adipose tissue and lower concentrations of sex hormone-binding globulins (McCluggage, 2011).In the present work, the most common bleeding patterns were post-menopausal in 42%, menorrhagia in 30%, metrorrhagia in 14%, meno-metrorrhagia in 10% and polymenorrhea in 4%. Maiti et al. (2018) reported the most common bleeding abnormality was menorrhagia 56% followed by postmenopausal bleeding 15.5%

In a study done by the Abo Haemila et al. (2005) most common bleeding pattern was menorrhagia (40%) followed by menometrorrhagia (22.8%) then metrorrhagia (34.2%). A similar study was carried out by Pyrai et al. (2006) on 50 patients with abnormal uterine bleeding revealed the most common complaints were : menorrhagia 20 cases (40%), metrorrhagia 9 cases (18%) and menometrorrhagia 7 cases(14%). Arnold and Saravanan (2015) reported the most common cause of AUB was heavy menstrual bleeding (HMB) in maximum no. of cases (43.7%). Shobhita et al. (2015) showed menorrhagia in (40%) of cases and polymenorrhagia in 25% of patients. In the study by Ahmad et al. (2012) most common bleeding pattern was menorrhagia 31% followed by menometrorrhagia 28% then metrorrhagia 21%. In the present study, the pelvic examination were normal sized uterus in 46% of cases, normal sized uterus/endocervical polyp in 16% of cases, enlarged uterus in 26% of cases, enlarged uterus/endocervical polyp in 8% of cases and enlarged uterus with palpable mass in 4% of cases. There was a study carried out by Ogila et al. (2013) that showed bulky uterus in 3 cases (8.6%), fibroid in 10 cases (28.6%), endocervical polyp in 2 cases (5.7%) and in 20 cases (57.1%) examination reveal normal findings. In the present study, the ultrasound finding was fibroid in 7 cases (14%), thickened endometrium in 17 cases (34%), adenomyosis in 5 cases (10%) and polyp in 6 cases (12%). Ebrashy et al. (2004) examined 65 cases by both TVS 2D and 3D ultrasound and the results are by 2D ultrasound: 13 cases are normal, 7 cases showing endometrial polyps, 29 cases having

myomas either single or multiple from which 8 had submucousmyomas, 12 cases had thickened endometrium while by 3D ultrasound: 9 cases are normal. In a study done by Hemila et al. (2005) detected by 3D U/S 14 myomas (20%), 8 polyps (11.43%), and it could differentiate these myomas as 10 interstitial (14.29%) and 4 submucous (5.71%) in relation to the endometrial encroachment while by hysteroscopy detected 6 myomas (8.57%) which are all submucous and 11 polyps (15.72%). In the study carried out by Pyrai et al. (2006) on 50 patients with abnormal uterine bleeding by TVS, it detected 13 myomas (26%), 4 polyps (8%), 3adenomyosis (6%), 10 hyperplasia (20%), 2 endometrial carcinoma (4%) and 2 atrophic endometrium (4%). In study done by Takreem et al. (2009) reported 15% of cases with AUB suffered from endometrial hyperplasia among 100 perimenopausal women.

Shokouhi (2015) examined by 3D U/S detected adenomyosis in 22 cases(22%), fibroid in 37 cases (37%), hyperplasia in 15 cases (15%), polyps in 14 cases (14%) and no pathology in 12 cases (12%). These fibroid lesions detected by 3D U/S are located as:submucous in 18 cases (48.64%), intramural in 11 cases (29.72%) and subserous in 8 cases (21.62%).

Choudhary et al. (2017) noticed on examination by hysteroscopy in women with AUB; 20% cases with endometrial hyperplasia and other intrauterine pathology observed was polyp which was found in 16% of cases, sub mucosal fibroid in 8% of cases respectively.
The results of our study show that by using three dimensional ultrasound equipment it is possible to measure endometrial volume in the majority of abnormal uterine bleeding. The measurements were reproductive and more likely to reflect the true endometrial volume than estimation based on the calculation of the volume of an ovoid (Shipely, et al, 1992). The shape of uterine cavity, practically in patients with invasive carcinoma, rarely resembles an ideal ovoid; this prevents the use of mathematical formulae for the calculation of its volume. The only way to measure, it is to outline its surface in a number of parallel sections, which would take into account irregularities of its shape. This the principle of volume measurement used with three-dimensional ultrasound equipment. The accuracy of this has been confirmed previously in in vitro conditions (Gilja, et al, 1994).

Our primary objective was to investigate whether the measurement of endometrial volume could be used to the ultrasound diagnosis of endometrial carcinoma. Although endometrial thickness is useful in the diagnosis of endometrial atrophy, it has not been possible to differentiate between endometrial cancer and benign uterine pathology by measurements of thickness alone (Nasri, M.N., et al, l989), (Sladkenicius, P V.1994). Therefore, in patients with endometrial thickness of 5mm or more, histological diagnosis is required, to exclude significant pathology and initiate appropriate therapeutic measures. Our results confirm that there is a considerable overlap in endometrial thickness between patients with benign and those with malignant pathology.

When volume measurements were performed, the overlap between different groups of patients was much smaller which significantly improves the diagnosis of cancer. All but one patients with cancer had a large endometrial volume of more than 19ml. with cut off level of 19 ml none of the cancers would have been missed these was confirm by other study (K. Gruboeck, et al 1996). In a study by*Kupesic&Kurjak (1999),* the endometrial volume in hyperplasia had the mean value of 7.82 ± 7.60 cm^3 and was significantly higher than the volume in patients with polyps (mean 2.63 ± 2.12 cm^3). This was not found in the present study. In the study done by (M. Odeh et al., 2007) in premenopausal patients the endometrial volume was 6.87± 6.3 cm^3 in the normal group and 13.79 ± 13.2 cm^3 in the pathologic group. Endometrial volume was 18.1 cm^3 in patients with endometrial cancer and 11.2 cm^3 in patients with hyperplasia; both were significantly higher than in the normal.In the study by (Stachowicz N. et al., 2002) the mean endometrial volume in women with endometrial cancer was 19.9 ± 7.5 cm^3. The mean volumes measured in women with endometrial hyperplasia and normal endometriums were 12.2 ±7.9 cm^3 and 7.4 ±4.8 cm^3, respectively.

Endometrial thickness measurements gave less accurate predictions. In the present study, the mean endometrial thickness in endometrial hyperplasia was 10.7±4.9 mm, disordered proliferative was 10.7±4.4 mm, atrophic endometrium was 4.5±3.5 mm, endometrial polyp was 12.9±9.7 mm and adenocarcinoma was 15.9±8.3 mm.

Shobhitha et al. (2015) reported that when the endometrial thickness is < 4mm, two cases showed endometrial hyperplasia.When endometrial thickness is between 4-8 mm -10.5 percent of the cases showed endometrial hyperplasia. When the endometrial thickness is between 8-15 mm, 56% of the patients showed endometrial hyperplasia. When endometrial thickness was > 15 mm, all the patients showed endometrial hyperplasia. In patients, presenting with abnormal uterine bleeding when the endometrial thickness was less than 11mm endometrial carcinoma was not observed in Premenopausal patients. In Post-Menopausal patients 37.5% of patients, had endometrial hyperplasia when the endometrial thickness was more than 5mm. Endometrial carcinoma was not observed when the endometrial thickness was less than 15mm(Shrestha et al., 2018). In the study done by Chaudhari andSatia (2016) the mean endometrial thickness in endometrial carcinoma was 11.95mm. Volume measurements also showed significant differences in size between endometrial hyperplasia and polyps which were not detected by the measurement of endometrial thickness. These may be explained by the fact that polyps are usually localized thickenings of the endometrial that do not affect the whole of uterine cavity. Therefore, it is logical that their volume is much smaller, while the maximum thickness is similar to that of hyperplasia these was confirmed by other study (K. Gruboeck, et al 1996).

In patients with a very thin atrophic endometrium, volume measurements contributed little to the diagnostic accuracy. When the endometrium looked atrophy with a thickness of <5mm, the measurement of endometrial volume was more difficult. However, all patients with an endometrium volume <5cm^3 had endometrium atrophy on histological examination. In patients with endometrial

cancer, there was a clear tendency for endometrial volume to increase with grade and stage of the tumor. The depth of myometrium invasion showed positive correlation with both endometrial thickness and endometrial volume. However, the differences were not large and it is unlikely that the measurement of tumor size will be more useful for the diagnosis of invasion than B-mode imaging these was confirmed by other study (K. Gruboeck, et al 1996).

In the present study,thehisto-pathological finding were atrophic endometrium in 4 cases (8%), disordered proliferative in two cases (4%), endometrial polyp in 18 cases (36%), endometrial hyperplasia in 7 cases (14%), malignancy in two cases (4%) and cystic changes in two cases (4%). Atrophic endometrium is thin walled veins, superficial to the expanding cystic glands, make the vessels vulnerable to injury and lead to excessive uterine bleeding (Baral and Pudasini, 2011). Atrophic endometrium was seen in 5.13% of the patients in study done by Sajitha et al. (2014) and with incidences of 4.34% (Cornitescu et al., 2011) and 7% (Ara and Roohi, 2011).

Pasqualotto et al. (2000) compared similar parameters on 375 patients complaining of abnormal uterine bleeding and the main pathological findings are endometrial polyps 172 (45.9%) and submucousmyomas 105 (28%) Whereas in the study carried out by Ryu et al. (2004) on 105 patients, histopathology revealed the presence of 37 endometrial polyps (35%), 26 submucousmyomas(25%), 12 endometrial hyperplasia (11%), 3 endometrial carcinoma (3%), 2 adenomyomas (2%) and 24 cases (23%) showed no organic lesion.
Disordered proliferative endometrium is an exaggeration of the normal proliferative phase without significant increase in the overall ratio of glands to stroma and it is due to persistent estrogen stimulation (Mutter,2002). The disordered proliferative endometrium resembles normal proliferative tissue in consisting of glands lined by cytologically bland, pseudostratified, proliferative, mitotically active epithelium and in having a normal ratio of glands to stroma. It differs from the normal proliferative endometrium in the absence of uniform glandular development. Disordered proliferative pattern lies at one end of the spectrum of proliferative lesions of the endometrium that includes carcinoma at the other end with intervening stages of hyperplasias(Doraiswami et al., 2011).Histopathological examination in the study by Pyrai et al. (2006) showed normal endometrium in 9 cases (18%), myomas in 16 cases (32%), endometrial polyps in 6 cases (12%), endometrial hyperplasia in 11 cases (22%) and endometrial carcinoma in 2 cases (4%). Damle et al. (2013) reported the predominant histopathological findings were proliferative endometrium (34.09%) in perimenopausal women and Atrophic endometrium in the postmenopausal (25.8%).

Conclusion

Endometrial hyperplasia is the commonest observed endometrial abnormality in peri-menopausal and postmenopausal patients with abnormal uterine bleeding.Histopathological examination of the endometrium is the gold standard for diagnosis or exclusion of endometrial pathology, 3D ultrasound is a reasonably accurate, helpful and non-invasive tool for assessing the endometrium. The use of 3D volume measurement might be used better to characterize endometrial changes in women with perimenopausal and postmenopausal bleeding. The measurement of endometrial volume was superior to that of endometrial thickness as a diagnostic test for the detection of endometrial cancer in perimenopausal and post-menopausal bleeding. Both endometrial thickness and volume were higher in patients with advanced and less differentiated cancers.

References

Abo Haemila F., Youssef D., Hassan M., Soliman A and Mosaad M. (2005): A comparative study of 3D ultrasonography and hysteroscopy in detecting uterine lesions in premenopausal bleeding. Middle East Fertility Society Journal, 10(3): 12-19 .
ACOG (2001): practice bulletin. Clinical management guidelines for obstetrician-gynecologists. Use of botanicals for management of menopausal symptoms. ObstetGynecol, 96(6):1-11 .
ACOG (2009): The role of transvaginal ultrasonography in the evaluation of postmenopausal bleeding. ObstetGynecol, 113(2): 462-464.
Abdel-Aleem H., d'Arcangues C., Vogelsong KM., Gaffield ML and GülmezogluAM. (2013): Treatment of vaginal bleeding irregularities induced by progestin only contraceptives. Cochrane Database Syst Rev., (10):CD003449.
Bazot M., Cortez A and Darai E. (2001): Ultrasonography compared with magnetic resonance imaging for the diagnosis of adenomyosis: correlation with histopathology. Hum Reprod, 16(11):2427-2433.
Belitsos P, Papoutsis D, Rodolakis A, Mesogitis S and Antsaklis A.(2012): Use of Three-Dimensional Power Doppler Ultrasound for the study of cervical cancer and precancerous lesions. Ultrasound Obstet Gynecol. 2012 Feb 10. doi: 10.1002.
Chaudhari L and Satia NM. (2016): To study the correlation between endometrial thickness on transvaginal sonography and endometrial histopathology in women with postmenopausal bleeding. International Journal Reproduction Contraception Obstetetrics and Gynecology, 5(5):1309-1315.
ChhiengDC.,Elgert P., Cohen JM and Cangiarella JF. (200**6**): Clinical implications of atypical glandular cells of undetermined significance, favor endometrial origin. Cancer, 93:351-356.
Eitan R., Saenz CC and Venkatraman ES. (2005): Pilot study prospectively evaluating the use of the measurement of Preoperative sonographic endometrial thickness in postmenopausal patients with endometrial cancer. Menopause, 12: 27-30.
Lavie O., Barnett-Griness O and Narod S.A. (2008): The risk of developing uterine sarcoma after tamoxifen use. Int J Gynecol Cancer., 18: 352–356.
Markovitch O., Tepper R., Aviram R., Fishman A and Shapira J. (2004): The value of sonohysterography in the prediction of endometrial pathologies in asymptomatic postmenopausal breast cancer tamoxifen treated patients. GynecolOncol, 94(3):754-759.

Pasqualotto EB., Margossian H., Price LL and Bradley LD. (2000): Accuracy of preoperative diagnostic tools and outcome of hysteroscopic management of menstrual dysfunction.Am J AssocGynecolLaparosc, 7(2): 201-209.
Ray S and Ray A. (2016): Non-surgical interventions for treating heavy menstrual bleeding (menorrhagia) in women with bleeding disorders. Cochrane Database Syst Rev, 11:CD010338.
Remondi C., Sesti F., Bonanno E., Pietropolli A and Piccione E. (2012): Diagnostic accuracy of liquid-based endometrial cytology in the evaluation of endometrial pathology in postmenopausal women. Cytopathology, 9:1-8.
Sinclair D.C., Mastroyannis A and Taylor H.S. (2011): Leiomyoma simultaneously impair endometrial BMP-2-mediated decidualization and anticoagulant expression through secretion of TGF-beta3. J ClinEndocrinolMetab, 96: 412–421.
Sladkevicius P., Valentin L and Marsal K. (1994):Endometrial thickness and Doppler velocimetry of the uterine arteries as discriminators of endometrial status in women with postmenopausal bleeding: a comparative study. Am.J. Obstet. Gynecol., 171,722-8.
Whitaker L and Critchley HO. (2016): Abnormal uterine bleeding. Best Pract Res ClinObstetGynaecol, 34: 54–65.
Yarandi F., Izadi-Mood N., Eftekhar Z., Shojaei H and Sarmadi S. (2010): Diagnostic accuracy of dilatation and curettage for abnormal uterine bleeding. J ObstetGynaecol Res., 36(5):1049-1052.