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Correlation between Transvaginal Sonography and Hysteroscopy in Evaluation of Abnormal Uterine Bleeding

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ABSTRACT

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. To assess the usefulness of hysteroscopy in comparison with Transvaginal sonography in abnormal uterine bleeding evaluation. This study was conducted on 50 female patients with abnormal uterine bleeding in Department of Obstetrics and Gynaecology at Sree Mookambika Institute of Medical Sciences based on inclusion and exclusion criteria. Each patient was subjected to Transvaginal sonography where uterine cavity was studied in detail and hysteroscopy under anaesthesia using saline as distension medium. Sensitivity, specificity and predictive value of Transvaginal sonography as compared to hysteroscopy were calculated. On Transvaginal sonography, out of total 50 patients, 22 patient showed normal endometrium, 12 patient showed thickened endometrium, 10 showed endometrial polyp, 5 showed submucosal fibroid and 1 showed irregular shadow. Transvaginal sonography was found to have a very high sensitivity of 90.90%, specificity of 85.71%, disease prevalence rate of 44.0%, positive predictive value of 83.33% and negative predictive value of 92.30%. Transvaginal sonography is recommended as first line investigation in abnormal uterine bleeding. If TVS shows normal cavity, further evaluation can be omitted and patient started directly on medical treatment for her symptoms.

INTRODUCTION

Abnormal uterine bleeding (AUB) 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 may be due to anovulation, pregnancy (retained products of conception) uterine pathology and coagulopathies. The term AUB usually indicates one of the following clinical presentations-menorrhagia(abnormally long or heavy menses lasting >7 days or involving blood loss >80 mL) metrorrhagia (menses occurring at irregular intervals) ormenometrorrhagia (a combination of menorrhagia and metrorrhagia). Differential diagnosis of AUB includes problems related to pregnancy, infection, vaginal and cervical abnormalities, benign and malignant uterine neoplasia, coagulopathies, endocrine disorders, trauma, foreign bodies, systemic disease and bleeding related to medications[1]. History taking and physical examination are the most useful tools for starting the evaluation of AUB. Anything that can significantly improve the accuracy of diagnosing the cause of bleeding, can reduc aim of the study to compare the accuracy of TVS with hysteroscopy in cases of abnormal uterine bleeding and to formulate the ideal investigation protocol.

MATERIALS AND METHODS

This is a prospective observational study conducted in Department of Obstetrics and Gynaecology at Sree Mookambika Institute of Medical Sciences from May 2022 to July 2023. The study population included female patients attending the outpatient department for abnormal uterine bleeding and the sample size consisted of 50 patients.

Inclusion criteria: Patients with AUB who gives consent and were hemodynamically stable, married, patients where TVS is desirable, uterine size less than 12 weeks gestation, patients without known coagulation disorders nor cervical lesion or cancer.

Exclusion criteria: Patients with AUB who were hemodynamically unstable, unmarried, patients where TVS is not desirable, uterine size larger than 12 weeks gestation, patients with known coagulation disorders and those with cervical lesion or cancer were excluded.

Study design: Each patient meeting the selection criteria underwent a preliminary assessment by history and clinical examination. The bleeding pattern was categorized as either heavy menstural bleeding, metrorrhagia, menometrorrhagia or continuous bleeding for more than 21 days. The uterine size was assessed clinically and determined as normal or enlarged (in weeks of pregnancy size). TVS examination was performed at the first visit in the office setting itself. The uterine anatomy and the adnexa were visualized using a 7.5 MHz vaginal probe transducer (General Electric, Milwaukee, C3 real time sector scanner). Appearance of the endometrial stripe was recorded as either normal or abnormal a specific note wasmade of any focal lesion seen in terms of an endometrial polyp, submucosal fibroid, intramural fibroid or thickened endometrium (>12 mm). The contour of the endometrial stripe was assessed in the midline sagittal plane and the point of maximum thickness of the stripe (ET) was measured.

Hysteroscopy under anaesthesia was then scheduled at a subsequent visit. Hysteroscopy was scheduled in the early proliferative phase of the menstrual cycle in patients complaining of regular AUB. Hysteroscopy was performed using a 30° hysteroscope and diagnostic heath of 5mm diameter (Karl-Storz Endoscopy) with a fiberoptic cold light source; normal saline was used as the distending medium and the procedure was performed under direct video monitoring.

A total of 50 patients completed the study and underwent both TVS and hysteroscopy. The results of hysteroscopy were taken as the "gold standard" for the diagnosis of intracavitary pathology. Sensitivity, specificity and predictive value of the TVS in detecting the intracavitary lesions were calculated with hysteroscopy taken as the gold standard. Subgroup analysis of various TVS findings was also undertaken and accuracy of TVS in assigning the cause was determined for each pattern. Statistical analysis was done.

RESULTS

50 consecutive patients presenting with menstrual complaints who met the selection criteria were studied by TVS and hysteroscopy for this study and evaluated. The data was arranged in Microsoft Excel sheet and was analysed statistically. Table 1 depicts the distribution of various menstural abnormalities seen in our study group. Heavy menstural bleeding was the most common complaint amongst our patients (n = 28) followed by metrorrhagia (n = 15). Menomentrorrhagia and continuous bleeding for $\geq$21 days were less common symptoms seen in 5 and 2 women respectively. The size of the uterus in weeks of gestation. 30 patients had normal sized uterus, 20 patients had 6-weeks size uterus whereas 8-weeks and $\geq$10-weeks size uterus was seen in 8 and 2 patients respectively.

Table 3, On TVS we find that uterine cavity was normal in 22 patients presenting with various menstural abnormalities. The endometrial pattern was either trilaminar or secretory but the ET was less than 12mm. In 12 patients, the ET was thickened and more than 12 mm. Endometrial polyp was diagnosed in 10 patients and a submucosal fibroid in 5.1 patient

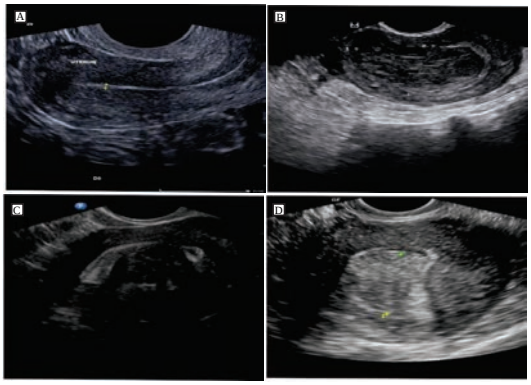

Fig. 1: Transvaginal sonography images(1.Normal uterine cavity with triple layer endometrium, 2. Thickened endometrium, 3. Endometrial polyp, 4. Submucosal fibroid)

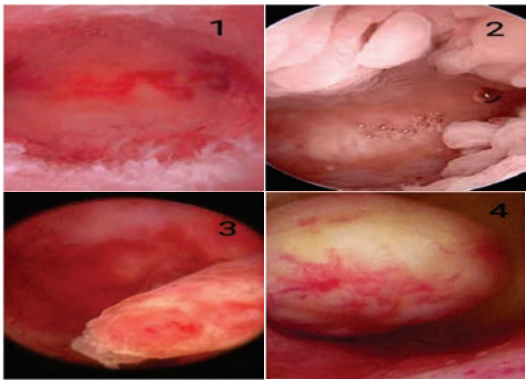

Fig. 2: Hysteroscopic images(Hysteroscopic images. 1. Normal uterine cavity, 2. Polypoidal thickened endometrium, 3. Endometrial polyp, 4. Submucosal fibroid)

Table 1: Distribution of bleeding patterns

Bleeding pattern	Number (n = 50)
Heavy menstural bleeding	28
Metrorrhagia	15
Menomentrorrhagia	5
Continues bleeding >21 days	2

Table 2: Clinical assessment of uterine size

Uterine size	Number (n = 50)
Normal size	30
6 weeks size	20
8 weeks size	8
≥10 weeks size	2

Table 3: TVS findings

TVS findings	Number (n = 50)
Normal endometrium with trilaminar or secretory but ET was less than the 12mm	22
Thickened endometrium with ET greater than 12mm	12
Endometrial Polyp	10
Submucosal fibroid	5
Irregular shadow? retained products of conception	1

Table 4: Hysteroscopy findings

Hysteroscopy findings	Number (n = 50)
Normal cavity	24
Polypoidal Endometrium	10
Endometrial Polyp	10
Submucosal Fibroid	5
Retained Products of conception	

with persistent irregular bleeding in the reproductive age group seemed to have retained products of conception on TVS assessment Fig. 1. 1.Normal uterine cavity with triple layer endometrium, 2. Thickened endometrium, 3. Endometrial polyp, 4. Submucosal fibroid. Hysteroscopic findings seen in our patients have been tabulated in Table 4. In 24 cases, hysteroscopy did not reveal any endometrial abnormality in the uterine cavity. Polypoidal endometrium was seen in 10 cases and a discrete endometrial polyp was identified in 10 cases. Submucosal fibroid was identified in 5. Retained products of conception seen in 1 case.

Table 5, shows the correlation between TVS and hysteroscopic findings. Of the 50 cases evaluated in this study, hysteroscopic findings matched the TVS findings in 44 cases. In 24 cases, TVS findings and Hysteroscopic findings are normal. In 2 cases, normal TVS shows abnormal Hysteroscopy. In 4 cases, abnormal TVS shows normal Hysteroscopy. And remaining 20 cases showed both abnormal TVS and Hysteroscopy.

Table 6, shows sub-group analysis of the various TVS findings. When we look at the subset of patients found to have normal endometrial cavity on TVS, we find that 20 out of 22 patients were actually found to have normal uterine cavity on hysteroscopy. In the thickened endometrium TVS subgroup, of the 12 patients, 9 were actually seen to have polypoidal endometrium on hysteroscopy but on 1 occasions, it was in fact an endometrial polyp and twice it turned out to be a normal uterine cavity. In the endometrial polyp subset of patients on TVS, 8 out of 10 patients were found to have endometrial polyps, 1 was found to have just polypoidal endometrium and one had normal uterine cavity. The submucosal fibroids were confirmed on hysteroscopy in 4 of 5 cases while the other has normal uterine cavity. 1 case has retained products of conception.

DISCUSSIONS

The results of our study were analysed statistically. It was found that TVS finding of a normal endometrium had an accuracy of 90.90%. When TVS diagnosis was thickened endometrium, hysteroscopy confirmed it to be polypoidal endometrium in 75% cases whereas if TVS diagnosis was endometrial polyp, the diagnosis was confirmed by hysteroscopy in 80% cases. Accuracy of TVS in the diagnosis of submucosal fibroids was found to be 80% in our study.

Sensitivity, specificity, disease prevalence, positive predictive value and negative predictive value were calculated. TVS was found to have a very high sensitivity of 90.90%, specificity of 85.71%, disease prevalence rate of 44%, positive predictive value of 83.33% and negative predictive value of 92.30%.

Table 6: TVS-hysteroscopy correlation sub-group analysis

TVS findings	Number(n = 50)	Hysteroscopic findings	Number (n = 50)
Normal Endometrium	22	Normal cavity	2
		Polypoidal endometrium	1
		Endometrial polyp	1
Thickened endometrium	12	Normal cavity	2
		Polypoidal endometrium	9
		Endometrial polyp	1
Endometrial polyp	10	Normal cavity	1
		Polypoidal endometrium	1
		Endometrial polyp	8
Submucosal fibroid	5	Normal cavity	1
		Submucosal fibroid	4
Retained products of conception	1	Polypoidal endometrium	0
		Retained products of conception	1

According to Goyal *et al*.[2] Menorrhagia was the commonest presenting symptom in the study population (n = 58) followed by metrorrhagia, menometrorrhagia and continuous bleeding ≥21 days. 74 female patients had normal size uterus. In 57 patients, the uterine cavity was normal on TVS. Thickened endometrium, endometrial polyp and submucous fibroids were seen in 19-16 and 6 patients respectively. Hysteroscopy showed normal cavity in 59 female patients and polypoidal endometrium, polyps or submucous fibroids in 41. TVS was found to have high sensitivity and specificity (95.23 and 94.82 respectively) and high positive and negative predictive value.

Based on study by Gadge *et al*.[3] Menorrhagia was most common bleeding pattern seen in 44% cases. The TVS findings in correlation with HPE where fibroid and hyperplasia with polyp were 100% diagnosed while hyperplasia, polyp and normal findings were diagnosed 53.33%, 88.89% and 53.33% respectively. Hysteroscopy findings in correlation with HPE where fibroid, hyperplasia and hyperplasia with polyp were 100% diagnosed while polyp and normal findings were diagnosed 83.33%, 73.33% respectively. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy of TVS and hysteroscopy were 82.05%, 72.73%, 91.43%, 53.33%, 80% and 89.74%, 100%, 100%, 73.33%, 92% respectively. They concluded that TVS is a good diagnostic initial modality for the diagnosis of endometrial lesions in AUB.

In the study by Choudhary *et al*.[4] among 100 patients of AUB in this study, majority of the patients were in perimenopausal age group. Menorrhagia is the most common presentation (45%) followed by postmenopausal bleeding (20%). Anaemia was detected in 79% of patients. Hysteroscopy was taken as gold standard and TVS findings were compared. The sensitivity of TVS in detecting polyps, submucous fibroid were 22.2%, 11% respectively and for the normal variants like proliferative and secretory it was 50% and 79.2% respectively. TVS showed good correlation with hysteroscope findings for normal variants of endometrium but poor correlation for intracavitary pathologies. Transvaginal sonography has a moderate diagnostic accuracy in detecting endometrial hyperplasia and other intrauterine pathology. TVS is safe, acceptable and easily available and is noninvasive. It should be used as 1st line diagnostic tool in patients with AUB in perimenopausal women.

In the study by Swathi *et al.*[5] Among 100 patients of AUB in this study, majority of the patients were in perimenopausal age group. Menorrhagia is the most common presentation (45%) followed by postmenopausal bleeding (20%). Anaemia was detected in 79% of patients. Hysteroscopy was taken as gold standard and TVS findings were compared. The sensitivity of TVS in detecting polyps, submucous fibroid were 22.2%, 11% respectively and for the normal variants like proliferative and secretory it was 50-79.2% respectively. TVS showed good correlation with hysteroscope findings for normal variants of endometrium but poor correlation for intracavitary pathologies. Thus, hysteroscopy is a rapid, safe, well tolerated and highly accurate means of diagnosing the cause of abnormal uterine bleeding in perimenopausal age group and is advised as a first line investigation in evaluation of AUB.

The study by Hassan *et al*.[6] revealed that sensitivity 2D TVS in detection of endometrial hyperplasia was 100%, specificity was 88.7%, PPV was 73.30%, NPV was 100% and accuracy was 94% with area under ROC curve 0.99 and sensitivity of hystroscope in detection of endometrial polyp was 36.3%, specificity was 100%, PPV was 100%, NPV was 84.7%, accuracy was 86% with area under ROC curve 0.45. Transvaginal sonography has a moderate diagnostic accuracy in detecting endometrial hyperplasia and other intrauterine pathology. It is safe, acceptable and easily available in most secondary and tertiary care setting and is noninvasive. It should be continued as 1st line diagnostic tool in patients with abnormal uterine bleeding in perimenopausal women. According to study done by Krampl *et al*.[7] 88 patients information suitable for analysis was obtained by all methods.The detection rate of focal intrauterine pathology using sonohysterography was (94.1%) but was significantly lower with transvaginal

ultrasonography (23.5%). In about 75% of all cases none of the methods used was able to correctly detect endometrial hyperplasia. Sonohysterography was significantly better than transvaginal ultrasonography in detecting focal intrauterine pathology. They conclude that sonohysterography may replace diagnostic hysteroscopy in many patients with AUB.

In the study by Kutlucan *et al*.[8] The complaint of menorrhagia was reported by 72.0% of participants. Histopathologically, 70.0% of the patients had endometrial polyps and leiomyoma being monitored. An endometrial polyp was detected in 58.0% of the patients by 2D TVS, 80.0% by 3D TVS and 68.0% by hysteroscopy. While 2D TS demonstrated 65.71% accuracy in the detection of an endometrial polyp, 3D TVS had an 80.0% accuracy and hysteroscopy had a 77.77% accuracy. An endometrial polyp was detected when the uterine area was $\geq$237 mm^{-2}. If the endometrial thickness was over 10.5 mm, it was found to be related to an endometrial polyp. According to the volume measurements by 3D TVS the detection of an endometrial polyp was made with 96.4% sensitivity, provided that the pathology volume was $\geq$0.082 cm^{-3}.In this cohort of patients,3D TVS achieved a high sensitivity to detect abnormalities and could be considered as an initial diagnostic modality, prior to the surgery and may rival invasive procedures,such as hysteroscopy.

In the study done by Reddy *et al*.[13] majority of the patients were in perimenopausal age group. Transvaginal sonography has showed 12-8.3% sensitivity in detecting polyp and submucosal fibroid when compared to hysteroscopy. Transvaginal sonography showed poor correlation with hysteroscopic findings for intracavitary pathology. Intrauterine adhesions were missed by TVS in three cases which were diagnosed by hysteroscopy. There is an increased incidence of intracavitary uterine pathology in patients who present with AUB. The poor sensitivity of TVS in detecting intrauterine pathology urges us to suggest that hysteroscopy can be utilized as a first-line investigation in these patients. As many cases with intracavitary lesions and carcinoma were not diagnosed by TVS the need for number of diagnostic hysteroscopies (invasive) could not be minimized by TVS (noninvasive) examinations.

CONCLUSION

TVS is recommended as first line investigation in AUB. If TVS shows normal cavity, further evaluation can be omitted and patient started directly on medical treatment for her symptoms.

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