

Role of Sonography in the Evaluation of Endometrial Aetiology in Abnormal Uterine Bleeding

Seema Pandey¹, Mamta Kumari², Amrita Chaurasia³, Gyan Prakash⁴

¹ Department of Radio-Diagnosis, M.L.N. Medical College, Prayagraj, Uttar Pradesh, India. ² Department of Obstetrics and Gynaecology, M.L.N. Medical College, Prayagraj, Uttar Pradesh, India. ³ Department of Obstetrics and Gynaecology, M.L.N. Medical College, Prayagraj, Uttar Pradesh, India. ⁴ Department of Social and Preventive Medicine, M.L.N. Medical College, Prayagraj, Uttar Pradesh, India.

ABSTRACT

BACKGROUND

Abnormal uterine bleeding is an important cause of morbidity in the female population, which can be attributed to several reasons. Trans-vaginal sonography and saline-infusion sonography are the mainstay of diagnosis and govern the further management of this condition. This study was conducted to evaluate the thickness and pattern of endometrium with transvaginal sonography and determine any abnormality in the uterine cavity which can be attributed to saline infusion sonography (SIS) in cases of abnormal uterine bleeding (AUB).

METHODS

The study was conducted among 122 women with complaints of abnormal uterine bleeding attending Outpatient Department and indoor cases of a tertiary care hospital over a period of twelve months.

RESULTS

The most common presenting complaint was heavy menstrual bleeding in 27.04 % cases. Maximum (44.26 %) cases had normal finding on transvaginal sonography; most common pathological finding was leiomyoma (22.31 %), and endometrial hyperplasia (15.5 %). More than one third (37.7 %) of patients had no abnormalities on saline infusion sonography; while 62.3 % had one or more pathologies; the most common lesion was fibroid in 25.4 % cases. Normal proliferative and secretory endometrium was found on histopathological examination in 50 % cases, while remaining half cases had one or more pathology, most common pathology detected was endometrial hyperplasia in 25.4 % cases. On trans-vaginal sonography (TVS), 11 cases of endometrial polyp were missed, which were detected after infusion of saline and confirmed by histopathological examination. The diagnostic indices of SIS were superior to TVS in diagnosis of any pathology. Sensitivity of TVS was 86.94 % and SIS was 91.94 %. Specificity of TVS (75.41 %) was greater than SIS (68.33 %).

CONCLUSIONS

TVS and SIS scanning techniques play a very important role in endometrial disorders in woman with AUB.

KEYWORDS

SIS, Transvaginal, AUB, Endometrium

Corresponding Author:

*Dr. Seema Pandey,
45, Baghambari Housing Scheme,
Allapur, Allahabad – 211006,
Uttar Pradesh, India.
E-mail: docseemapandey@gmail.com*

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BACKGROUND

Abnormal uterine bleeding accounts for more than two thirds of any gynaecologic problem.¹ The term is broadly used for symptoms resulting from a any change from the usual pattern of a normal menstrual cycle. Abnormal uterine bleeding can occur in pre / peri-menopausal or post-menopausal females. The most probable reasons are cited as anovulation or endometrial carcinoma. A popular system of classification of cases of abnormal uterine bleeding is the PALM-COEIN method.² PALM-COEIN stands for stands for polyp, adenomyosis, leiomyoma, malignancy, coagulopathy, ovulatory dysfunction, endometrial, iatrogenic and not-yet-classified, which forms the objective of diagnosis.

The two main graded diagnostic tools used to detect uterine pathologies are transvaginal sonography and hysteroscopy. TVS may be considered the entry level screening tool, which can filter cases that require further hysteroscopic intervention from those uterine pathologies that can be detected solely by TVS. Being a non-invasive procedure, TVS has its inherent limitations, which mandates usage of the invasive hysteroscopy procedure. However, being costly and discomforting,³ hysteroscopy should be employed only when it is necessary to rule-out focal endometrial lesions. Apart from these two tools, SIS is another effective method to distinguish cases requiring surgical intervention,⁴ as it enables to assess the single layer of endometrial lining.⁵ The age-old approach of dilatation and curettage still remains a popular choice, when combined with the more modern methodologies.⁶ The purpose of the present study is to critically compare these diagnostic tools with the clinical spectrum of abnormal uterine bleeding.

Objectives

This study was conducted to evaluate thickness and pattern of endometrium with transvaginal sonography and find out any abnormality in uterine cavity by saline infusion sonography. Secondary objectives were to determine histopathological pattern of endometrium and to correlate the endometrial pattern and thickness by transvaginal ultrasound with endometrial histopathology in patients with abnormal uterine bleeding.

METHODS

The study was conducted between August 2018 to July 2019. This was a longitudinal observational study amongst a cohort of cases presenting with abnormal uterine bleeding. The present study was done in Swaroop Rani Nehru hospital and Kamala Nehru Hospital, Department of Obstetrics and Gynaecology, Moti Lal Nehru Medical College, Prayagraj U.P. The study was conducted on 122 women with complaints of abnormal uterine bleeding over a period of twelve months. Women of 21 - 55 years of age were included. Cases of pregnancy, use of intrauterine devices (IUCDs), any drug intake (including oral contraceptives and tamoxifen), lactating women in first 6 months of post-natal period, medical diseases and bleeding disorders, active genital tract

infection and vaginal & cervical causes of bleeding were excluded from the study.

After eligible case selection, detailed general and gynaecological examination was done. Routine lab investigations were performed including complete blood count (CBC), random blood sugar (RBS), liver and Kidney function tests, baseline thyroid function and coagulation profile. Tuberculosis-polymerase chain reaction (TB-PCR) was done when tuberculosis was suspected, and urine pregnancy test was done to exclude pregnancy. Cases were subjected to sonographic examination. Transvaginal ultrasonography (TVS) was used to evaluate endometrial thickness, lining of endometrium and for other possible causes of heavy menstrual bleeding like leiomyoma, endometrial polyp and adnexal pathology. Saline infusion sonography (SIS) was done to diagnose any intra-cavitary abnormalities. It was best performed during proliferative phase of menstrual cycle not more than day 10, except for cases that presented with continued or heavy bleeding. In postmenopausal women, the examination was performed at any time.

Endometrial biopsy samples were collected and sent for histopathological examination and TB-PCR test. Histopathology was correlated with clinical symptoms and ultrasound results.

Statistical Methods

The sensitivity, specificity, true positive and true negative values were calculated by using statistical package International Business Machines Statistical Package for the Social Sciences (IBM SPSS) 18.0, whereas other statistical analysis was performed by using Microsoft Excel 2016.

RESULTS

Age	Frequency	Percentage
20 - 40 yrs.	54	44.2
41 - 50 yrs.	65	53.27
> 50 yrs.	3	2.4

Table 1. Age-Distribution of Study Participants (N = 122)

The study was conducted on 122 cases, which were subjected to TVS, SIS and histopathology. As seen in Table 1, maximum number of patients, 65 (53.27 %) were of perimenopausal age group (41 - 50 years). The most common presenting complaint was heavy menstrual bleeding, present in 33 (27.04 %) cases and 26 (21.31 %) cases had frequent menstrual bleeding. It was noticed that only 5 (4.09 %) cases had scanty menstrual cycle and 2 (1.6 %) cases had postmenopausal bleeding. Maximum number of cases 54 (44.26 %) had normal finding on transvaginal sonography, most common pathology detected on transvaginal sonography was leiomyoma diagnosed in 27 (22.1 %) cases, endometrial hyperplasia in 19 (15.5 %), endometrial polyp in 9 (7.3 %) cases, hyperplasia with polyp in 5 (4.09 %) cases and adenomyosis in 8 (6.55 %) cases. Maximum number of cases, 52 (42.6 %) had endometrial thickness on transvaginal sonography 10 – 14 mm, 41 (33.6 %) had 5 – 9 mm endometrial thickness, 15 (12.2 %) had

15 – 19 mm endometrial thickness. 9 (7.3 %) cases had endometrial thickness > 20 mm and minimum number of cases 5 (4.09 %) had endometrial thickness less than 4 mm.

Variable		No. of Cases	%
Symptoms	Heavy menstrual bleeding (HMB)	33	27.04
	Frequent menstrual bleeding	26	21.31
	Infrequent menstrual bleeding	14	11.4
	Prolonged menstrual bleeding	15	12.2
	Shortened menstrual bleeding	6	4.9
	HMB + frequent cycle	13	10.6
	Irregular cycle	8	6.5
	Scanty menstrual cycle	5	4.09
	Post-menopausal bleeding	2	1.6
	Normal	54	44.26
Transvaginal sonographic finding (TVS)	Leiomyoma	27	22.1
	Endometrial polyp	9	7.3
	Adenomyosis	8	6.55
	Hyperplasia	19	15.5
	Hyperplasia + Polyp	5	4.09
Endometrial thickness on TVS	< 4 mm	5	4.09
	5 - 9 mm	41	33.6
	10 - 14 mm	52	42.6
	15 - 19 mm	15	12.2
	20 mm	9	7.3
SIS (Saline infusion sonography)	Normal	46	37.7
	Leiomyoma	31	25.4
	Endometrial polyp	17	13.9
	Adenomyosis	8	6.55
	Hyperplasia	13	10.6
Histopathological findings	Hyperplasia + Polyp	7	5.7
	Proliferative endometrium	42	34.4
	Secretory endometrium	19	15.5
	Atrophic endometrium	3	2.4
	Endometrial polyp	16	13.1
	Endometrial hyperplasia	31	25.4
	Endometrial hyperplasia + polyp	6	4.9
	Tubercular endometritis	4	3.2
	Malignancy	1	0.8

Table 2. Distribution of Cases According to Symptoms, Sonographic and Histopathological Findings

Maximum number of patients, 46 (37.7 %) had normal finding on SIS. Leiomyoma was present in 31 (25.4 %) cases. Endometrial polyp was diagnosed in 17 (13.9 %) cases, endometrial hyperplasia in 13 (10.6 %) case and adenomyosis in 8 (6.55 %) cases. In 7 (5.7 %) cases, both endometrial hyperplasia and polyp were present. Most common histopathological finding was proliferative endometrium present in 42 (34.4 %) cases, secretory endometrium was present in 19 (15.5 %) cases, atrophic endometrium in 3 (2.4 %) cases, endometrial polyp was present in 16 (13.1 %) cases, endometrial hyperplasia was present in 31 (25.4 %) cases, tubercular endometritis in 4 (3.2 %) cases and minimum number of case 1 (0.8 %) had malignancy. On comparing finding of transvaginal sonography with histopathology, 46 cases had normal finding on both TVS and histopathology and 53 cases had some pathology on both. 8 cases had normal findings on TVS. Some abnormalities detected on histopathology included 2 showed atrophic endometrium, 4 had endometrial hyperplasia and 2 showed tubercular endometritis.

Fifteen cases were diagnosed with some abnormalities on TVS, but normal findings on histopathology. Out of 27 cases of leiomyoma diagnosed by transvaginal sonography, 15 cases showed normal proliferative and secretory endometrium on histopathology, 4 cases had endometrial polyp and 8 cases had endometrial hyperplasia on histopathology. It may be due to subserosal and intramural leiomyoma that can't be picked up and some of submucous leiomyoma were also missed on dilatation and curettage. Five cases of hyperplasia with polyp on transvaginal sonography were confirmed by histopathology.

- Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) of transvaginal sonography was 86.89 %, 75.41 %, 77.94 % and 85.19 % respectively.
- Sensitivity, specificity, PPV, NPV of saline infusion sonography are 91.94 %, 68.33 %, 75 % and 89.13 % respectively.

On comparing findings of saline infusion sonography with histopathology, 41 cases had normal finding on both SIS and histopathology, 57 cases had some pathology on both, 5 cases had normal findings on SIS but showed certain abnormalities on histopathology, namely atrophic endometrium in 3 (6.5 %) and tubercular endometritis in 2 (4.3 %), which were missed on saline infusion sonography. Nineteen cases were diagnosed with some abnormalities on SIS but normal finding on histopathology. Out of 31 cases of leiomyoma diagnosed on saline infusion sonography, 16 (51.6 %) had endometrial hyperplasia and 1 (3.2 %) case had endometrial polyp on histopathology.

Out of 17 cases of endometrial polyp on SIS; 15 (88.2 %) were confirmed by histopathology, 1 (5.8 %) had normal finding and 1 (5.8 %) had endometrial hyperplasia on histopathology. Eight cases of adenomyosis diagnosed on saline infusion sonography.

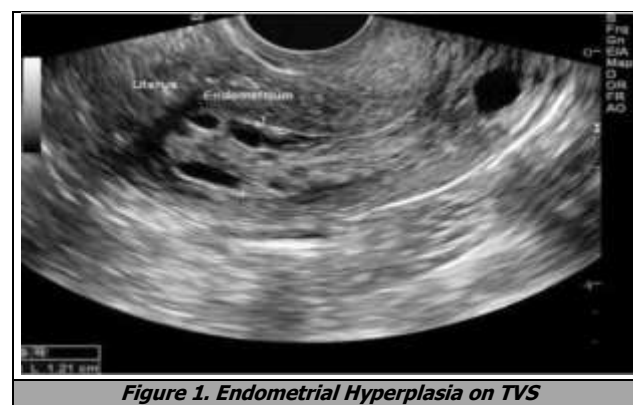


Figure 1. Endometrial Hyperplasia on TVS

Histopathological Findings vs. TVS / SIS Findings–Number (%)													
TVS / SIS Findings		Normal		Leiomyoma		Endometrial Polyp		Adenomyosis		Endometrial Hyperplasia		Hyperplasia + Polyp	
Histopathological Findings		TVS	SIS	TVS	SIS	TVS	SIS	TVS	SIS	TVS	SIS	TVS	SIS
	TOTAL	54	46	27	31	9	17	8	8	19	13	5	7
	Normal	46 (89.1)	41 (89.1)	15 (55.5)	14 (45.5)	0	1 (5.8)	0	1 (12.5)	0	2 (15.3)	0	1 (14.25)
	Atrophic	2 (3.7)	3 (6.5)	0	0	0	0	1 (12.5)	0	0	0	0	0
	Polyp	0	0	4 (14.8)	1 (3.2)	7 (77.7)	15 (88)	1 (12.5)	0	4 (21.05)	0	0	0
	Hyperplasia	4 (7.4)	0	8 (29.6)	16 (51.6)	2 (22.2)	1 (5.8)	4 (56)	5 (62.5)	13 (68.4)	10 (76.9)	0	0
	Polyp + Hyperplasia	0	0	0	0	0	0	0	0	1 (5.2)	0	5 (100)	6 (85.7)
	Tubercular	2 (3.7)	2 (4.3)	0	0	0	0	2 (25)	2 (25)	0	0	0	0
Malignancy	0	0	0	0	0	0	0	0	0	1 (5.2)	1 (7.6)	0	0
Table 3. Histopathological Findings vs TVS / SIS Findings–Number (%)													

Table 3. Histopathological Findings vs TVS / SIS Findings–Number (%)

TVS Finding		Histopathology	
Abnormal	53		15
Normal	8		46
Total	61		61
Saline Infusion Sonography		Histopathology	
Abnormal	57		19
Normal	5		41
Total	62		60

Table 4. Comparison of Transvaginal Sonography and Saline Infusion Sonography Findings with Histopathology



Figure 2. Endometrial Polyp on SIS



Figure 3. Submucous Leiomyoma on SIS

5 (62.5 %) cases were confirmed by histopathology, 1 (12.5 %) had normal finding and 2 (25 %) had tubercular endometritis. Thirteen cases of endometrial hyperplasia 10 (76.9 %) cases confirmed by histopathology, 2 (15.3 %) had normal findings and 1 (7.6 %) case had endometrial carcinoma on histopathology.

DISCUSSION

Sharma N et al.⁷ had maximum cases (54 %) in the age group of 35 - 45 year which is in accordance with the present study,, Malavalli et al.⁸ observed maximum cases (40 %) in the age group 41 - 50 years This is in concurrence with the fact that abnormal uterine bleeding is most common in perimenopausal age group. This could be explained by the fact that menopause leads to reduced numbers of ovarian follicles, which in turn secrete less estrogen due to diminished gonadotropic stimulatory response.

In our study, the most common presenting complaint was heavy menstrual bleeding in 33 (27.04 %) cases, 26 (21.31 %) cases had frequent menstrual bleeding, 14 (11.4 %) cases had infrequent cycle, 15 (12.2 %) cases had prolonged menstrual bleeding, 13 (10.6 %) cases had heavy menstrual bleeding (HMB) + frequent cycle, 8 (6.5 %) cases had irregular cycle, 6 (4.9 %) cases had shortened menstrual bleeding and 5 (4.09 %) cases had scanty menstrual cycle and 2 (1.6 %) cases had postmenopausal bleeding. Similar was the observation of Pillai et al.⁹ wherein

the majority of cases (46.6 %) presented with menorrhagia and Maiti et al.¹⁰ had menorrhagia as the most common bleeding pattern (56 %).

In our study heavy menstrual bleeding was more common in age group 41 - 45 years in 14 (11.4 %) and also frequent cycles in 10 (8.2 %), prolonged menstrual bleeding in 7 (5.7 %) and infrequent cycles in 5 (4 %) more common in 41 - 45 years of age group. Postmenopausal bleeding was present in 51 - 55 years of age group. This is almost in concurrence with study by Malavalli et al.⁸ who observed 16 (40 %) cases in perimenopausal (41 - 50 years) age with menorrhagia as chief complaint.

In present study, majority of cases, 54 (44.26 %) had normal finding on transvaginal sonography, most common pathology detected on transvaginal sonography was leiomyoma diagnosed in 27 (22.1 %) cases, endometrial hyperplasia in 19 (15.5 %) cases, endometrial polyp in 9 (7.3 %) cases, hyperplasia with polyp in 5 (4.09 %) cases, adenomyosis in 8 (6.55 %) cases. In accordance with present study, Elserly et al.¹¹ found maximum number of (54.8 %) cases with normal finding on TVS, endometrial hyperplasia in 18 % cases, endometrial polyp in 16 % cases, submucous fibroid in 6 % cases and adenomyosis in 1.2 % cases. Chawla et al.¹² observed that 61.66 % cases had normal findings, 15 % had polyp, 6.66 % had submucous myoma and 16.66 % had endometrial hyperplasia. In contrast to our study, Kusumhaq et al.¹³ found leiomyoma in 42 % cases, normal finding in 28 % cases, adenomyosis in 6 % and polyp in 4 % cases.

In our study, 52 (42.6 %) cases had endometrial thickness (ET) 10 - 14 mm, 41 (33.6 %) had 5 - 9 mm, 15 (12.2 %) had 15 - 19 mm endometrial thickness, 9 (7.3 %) cases had endometrial thickness > 20 mm and only 5 cases (4.09 %) had endometrial thickness less than 4 mm. In contrast to our study, Elserly et al.¹¹ found 54.8 % cases with endometrial thickness < 10 mm, Pillai et al.⁹ had 46.6 % cases with endometrial thickness of 5 - 9.9 mm, 17.1 % had 10 - 14.9 mm and 10.2 % had endometrial thickness (ET) > 20 mm. Chaudhary et al.¹⁴ had 46 % cases with ET 6 - 9 mm, 30 % had 10 - 14 mm and 10 % had ET > 20 mm.

In the present study, on comparing the results of transvaginal sonography with histopathology, out of 54 cases with normal finding on transvaginal sonography, 46 cases showed normal finding on histopathology, while remaining 8 cases showed some abnormalities on histopathology. Similar observation by Sinha et al.¹⁵ found TVS diagnosis for histopathological proliferative case to be normal in majority 55 % cases, Yildizhan et al.¹⁶ found that with normal finding of TVS only 64.2 % cases were confirmed by histopathology, 3.5 % had endometrial hyperplasia, 3.5 % had submucous fibroid and 28.5 % had endometrial polyp.

In the present study, on comparing results of saline infusion sonography with histopathology, out of 46 cases with normal finding on sonohysterography, 41 (89.1 %) were confirmed by histopathology remaining 5 cases showed some abnormalities on histopathology; 3 cases showed atrophic endometrium and 2 cases had tubercular endometritis, which were missed on saline infusion

sonography. Sinha et al.¹⁵ found that in comparison to histopathology, saline infusion sonography was found to be normal in 70.6 % cases.

In the present study, sensitivity, specificity, PPV and NPV of transvaginal sonography were 86.89 %, 75.41 %, 77.94 % and 85.19 % respectively and of saline infusion sonography were 91.94 %, 68.33 %, 75 % and 89.13 % respectively. In Study by Sinha et al.¹⁵ sensitivity, specificity, PPV and NPV of TVS were 77.7 %, 56.0 %, 42.1 % and 82.4 % respectively and of SIS were 77.8 %, 76.2 %, 58.3 % and 88.9 % respectively. Study by Yildizhan et al.¹⁶ had sensitivity, specificity, PPV and NPV of TVS 65.2 %, 87.9 %, 81.0 % and 76.1 % respectively in detecting endometrial polyp and 95.8 %, 95 %, 85.1 % and 98.7 % in detecting submucous fibroid. TVS is not always able to distinguish between endometrial abnormalities and small focal lesions can be missed, as was evident in the present study wherein endometrial polyps were missed. TVS, due to its poor sensitivity, was found to be sub-optimal in evaluation of aetiology of abnormal uterine bleeding. On the other hand, SIS was much more helpful in detection of intra-cavitary abnormalities than TVS. Furthermore, it was seen that SIS and TVS, when utilised in combination, had much higher sensitivity in detecting intra-cavitary pathologies.

CONCLUSIONS

Usage of TVS as the primary diagnostic tool has the disadvantage of poor discrimination between endometrial and myometrial anomalies. However, when combined with SIS, the diagnostic yield may be enhanced significantly, as demonstrated in the present study.

Trans-vaginal sonography has traditionally been considered as the point of entry tool in the diagnostic flowchart of uterine pathology. Being convenient to the patient and to the healthcare provider, easy availability and being economical, it should be retained as the primary tool. However, SIS plays a very important role in overcoming the inherent limitations of TVS and both these techniques can have a synergistic role, especially in decision making before a surgical intervention. Saline infusion sonography (SIS), if used judiciously, can considerably bring down the need of hysteroscopic procedures that are being utilised for diagnosis of aetiology of abnormal uterine bleeding.

Thus, screening has a very important role in early diagnosis of endometrial pathologies in cases presenting with abnormal uterine bleeding. Judicious use of the correct combination of diagnostic tools can form the basis of early diagnosis, effective and evidence-based treatment and better outcomes in cases presenting with abnormal uterine bleeding.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.

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