http://jmscr.igmpublication.org/home/
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v7i7.175

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Role of Diagnostic Hysteroscopy in Abnormal uterine bleeding in perimenopausal females and its histopathological correlation

Authors
Dr Kalpana Tiwari[1], Dr Abhishek Pareek[2*]
[1]Assistant Professor, Dept. of Obstetrics and Gynecology, Mahatma Gandhi Hospital and College, Jaipur
[2]Senior Consultant, Dept. of Surgical Oncology, HCG Hospital, Jaipur
*Corresponding Author
Dr Abhishek Pareek
Senior Consultant, Dept. of Surgical Oncology, HCG Hospital, Jaipur, India

Abstract
Background: *Abnormal uterine bleeding is defined as any deviation from the normal menstrual cycle which includes any change in regularity, frequency of menses, duration or amount of bleeding during or in between periods. Objective of this study is to evaluate the diagnostic hysteroscopy in perimenopausal women with abnormal uterine bleeding.*
Methods: *This study was conducted in women presenting to the gynecological OPD with complain of abnormal uterine bleeding in perimenopausal age group. A total of 50 patients were subjected to diagnostic hysteroscopy.*
Results: *In this study the Mean age was 44.3 yr. Majority (48%) of patients were in age group of 40-44 yrs. 94% were multiparous. 50% presented with heavy menstrual bleeding. In 56% hysteroscopy was normal and remaining 44% showed abnormal endometrial finding, out of which endometrial hyperplasia seen in 20% cases, polyp in 16% and sub mucosal fibroid in 8% cases. Hysteroscopy has 100% sensitive and 100% specific for endometrial polyp and sub mucosal fibroid indicating that hysteroscopy is the best modality for diagnosing intrauterine pathologies. In the present study hysteroscopy had overall sensitivity, specificity, PPV, NPV 89.36%, 94.77%, 84% & 96.66%.*
Conclusion: *hysteroscopy is important tool for diagnosing various intrauterine lesions. It should be employed hand in hand in evaluation on AUB.*
Keywords: *AUB, Hysteroscopy, Endometrial pathology.*

Introduction

Abnormal uterine bleeding is defined as any deviation from the normal menstrual cycle which include any change in frequency, duration or amount of bleeding during menses or bleeding in between periods.[1, 2]

AUB is responsible for 20-30% of patients who attend gynecology OPD amongst women in reproductive age group and 50% in perimenopausal women[3].

The International Federation of Gynecology and Obstetrics working group on menstrual disorders has proposed a classification system (**PALM-COEIN)** for causes of the AUB in women.[4] There are nine main categories, which are arranged according to the acronym PALM-COEIN. PALM-

refers to structural causes and COEIN refers to nonstructural causes; the acronym stands for Polyp; Adenomyosis; Leiomyoma; Malignancy and hyperplasia; Coagulopathy; Ovulatory Dysfunction; Endometrial; Iatrogenic; and not yet classified.[4] More than one etiology can be present in same patient. Among all, fibroid and polyp are one of the most common causes responsible for AUB in approximately 20-40% women suffering from AUB.[5]

In perimenopausal women presenting with AUB Endometrial hyperplasia accounts for 11.8%, polyp 4.2% and adenocarcinoma5.5% as the etiologies.[6,]Endometrial hyperplasia is a known precursor for endometrial carcinoma. Less than 2% of hyperplasia without atypia progress to endometrial carcinoma in 23% over a mean duration of 4 years.[7, 8]

AUB needs to be investigated in detail with proper history, examination and investigations. Various tools available for diagnosis of AUB are Transvaginal Sonography (TVS), Saline Sonography, and Hysteroscopy all confirmed by histopathology report.

TVS is an inexpensive, non-invasive and a convenient way to assess the uterine pathology not discernible on pelvic examination. Therefore, it is recommended as a first line diagnostic tool for assessing uterine pathology.

In perimenopausal women, TVS showing ET of less than 5 mm, the probability of the woman having endometrial cancer is 1.7 % and it is 0.8 % when the cut-off is taken as 4 mm. Transvaginal ultrasound detects intracavitary abnormalities like uterine tumors, polyps, and endometrial and myometrial abnormalities with a sensitivity of 60–92% and a specificity of 62–93 %.[9]

Due to low sensitivity of TVS for diagnosing endometrial polyps and other intrauterine pathology, examination with other techniques like saline infusion sonohysterography (SIS) or hysteroscopy should be considered. Another limitation of ultrasound is that it cannot always reliably distinguish between benign proliferation, hyperplasia, polyps, and cancer, and in 5–10% of women with postmenopausal bleeding, the endometrium cannot be identified on TVS, these women need further evaluation with more sensitive techniques.

Hysteroscopy enables direct visualization of uterine cavity and giving an opportunity to treat the lesion in the same sitting if applicable.

Hysteroscopy is more sensitive than TVS or Dilation & Curettage which is performed blindly. Hysteroscopy is recommended to further evaluate the endometrium in perimenopausal women with abnormal uterine bleeding even when the endometrial echo texture is normal on transvaginal sonography. Hysteroscopy guided biopsy is considered the gold standard[10] for assessing the endometrium.

With advancement in hysteroscopy techniques and better equipment, hysteroscopy has now become very easy to perform on OPD basis office hysteroscopy with minimal anesthesia and complication.

In this study after detail clinical and physical examination TVS and hysteroscopy was done in all cases. The results of hysteroscopy were compared to finding with histopathology, and the sensitivity, specificity and efficacy of hysteroscopy in diagnosing the etiologies was calculated

Aim & Objective

1. To estimate the diagnostic accuracy of Hysteroscopy in evaluation of uterine cavity lesion in perimenopausal women with abnormal uterine bleeding.
2. To estimate the sensitivity and specificity of hysteroscopy in diagnosis of intracavitary lesion in perimenopausal women with abnormal uterine bleeding.

Methods

This is a prospective study conducted in department of Obstetrics & Gynecology in Mahatma Gandhi Hospital, Jaipur from 2017 to 2018 over a period of one year. Women in perimenopausal age group presenting to the

gynecological OPD with complain of abnormal uterine bleeding were the subject of interest.

The inclusion and exclusion criteria were applied and the women who were eligible to participate and who gave written consent were enrolled in the study.

A total of 50 women who met the inclusion criteria were selected and after explaining the procedure, the consent was signed.

Inclusion Criteria

1) Perimenopausal age group (40-55)
2) Having abnormal uterine bleeding
3) Uterus less than 12 weeks size.

Exclusion Criteria

1) Acute pelvic infection
2) Uterus more than 12 week size
3) Pregnant women
4) Vaginal or cervical cause of bleeding
5) Bleeding disorder
6) Any drug intake causing AUB

A detailed history including menstrual history regarding the cycle length, duration and amount of flow during menses was taken was taken and thorough clinical examination was done. A relevant medical history of any systemic illness and drug intake which can cause AUB was also taken. After the general physical examination local and per speculum examination was done to note for any abnormal vaginal discharge, erosion, cervical hypertrophy or cervical polyp. A per vaginal examination was done to know about any uterine cervical and adnexal abnormality.

Laboratory investigations including CBC, coagulation profile, random blood sugar, liver and kidney function test were done.

All the patients were subjected to transvaginal sonography and parameters such as endometrial thickness, uterine pathology, adnexal and any other pelvic pathology was noted; after that diagnostic hysteroscopy and guided biopsy was performed. The tissue was sent for histopathological examination.

Hysteroscopy

- **Proliferative phase** endometrium is smooth and pink-white in color, gland opening s appear as white ringed elevation surrounded with netlike vessel.
- **Secretory phase** Endometrium is lush and velvety.
- **Hyperplasia**- Thick hyper-vascular friable mucosa, and polypoid in appearance, further classified as simple or atypical by the pathologists
- **Polyp**- Soft intracavitary formation, which was easily mobilized and covered by mucosa with endometrial gland and no distended vascular network.
- **Fibroid**- Firm intracavitary formation with thin endometrial lining and superficial large blood vessels.
- **Endometritis**- Irregular proliferation of glands and the presence of chronic inflammatory cells e.g. plasma cells, macrophages, and lymphocyte in the endometrial stroma.

After tabulating the findings of Hysteroscopy, it was compared with histopathological diagnosis and the sensitivity, specificity, positive predictive value and negative predictive value of Hysteroscopy were calculated and analyzed.

Observations and Results

A prospective study conducted on 50 perimenopausal women with abnormal uterine bleeding to evaluate the efficacy and accuracy of Hysteroscopy**.**

Table No. 1- Distribution of Patient According to Age Group

Age	No. of Patients	Percentage
40-44	24	48%
45-49	19	38%
50-55	7	14%
Total	**50**	**100%**

In this study the age of patients ranged from 40-55 yr. Mean age was 44.3 yr. The proportion of patient in various age group categories is as follows 40-44 yrs., 45-49 yrs. and 50-55 yrs. 48%, 38%, 14% respectively. Majority 48% patients were in age group of 40-44 yrs. and minimum 14% in age group of 50-55 yr.

Table No. 2- Distribution of Cases According to Residence (Rural and Urban)

Residence (Rural/Urban)	No. of Patients	%
Rural	28	56
Urban	22	44
Total	**50**	**100**

In study population, 28 patients (56%) belonged to rural background and 22 patients (44%) from the urban area.

Table No. 3- Distribution According to Parity

Parity	No	%
Nulliparous	2	4
Primiparous	1	2
Multiparous	47	94
Total	**50**	**100**

In study population, 47/50 patients (94%) were multiparous, 2/50 (4%) were nulliparous, and 1/50 (2%) were primiparous. So commonest affected patients were para 2 and more

Table No. 4 Distribution of Cases According to Socioeconomic Status

Class	SE Stat	No	%
I	Upper	3	6
II	Upper Middle	2	4
III	Lower Middle	28	56
IV	Upper Lower	8	16
V	Lower	9	18
	Total	**50**	**100**

In current study maximum no of cases belonged to class III socioeconomic strata (56%). Rest of patients according to socioeconomic class were in class I (6%), Class II (4%), class IV (16%) and class V (18%) respectively.

Table no. 5 Distribution of cases according to the clinical presentation

Bleeding Pattern	No. of Patient	Percentage
Heavy Menstrual Bleeding	25	50%
Inter Menstrual Bleeding	9	18%
Frequent Bleeding	7	14%
Heavy Prolonged Bleeding	3	6%
Irregular Menstrual Bleeding	6	12%
Total	**50**	**100%**

Out of 50 cases; 50% presented with heavy menstrual bleeding, this is revised terminology by AICOG which correspond to menorrhagia, while frequent bleeding in (14%) of patients, intermenstrual bleeding in (18%) and heavy prolonged bleeding in (6%) and irregular bleeding in (12%) of patients.

Table No. 6 Distribution of Cases According to the Associated Complains

Associated Complain	No.	%
Pain Abdomen	22	44
Dyspareunia	3	6
Vaginal Discharge	4	8
Dysmenorrhea	5	10
No other Complaints	16	32
Total	**50**	**100**

Out of 50 cases of AUB, maximum no. of patients (44%) presented with complaints of pain abdomen, (10%) dysmenorrhea, (8%) vaginal discharge with and (6%) with dyspareunia, (32%) of patients had no associated complains.

Table No. 7 Distribution of Cases According the Past History of Contraception

Type of Contraception	No. of Patients	%
Barrier	4	8
No contraception	13	26
Sterilization	28	56
Oral pills	3	6
IUCD Users	2	4
Total	**50**	**100**

In study population, out of 50 cases (56%) patients had tubal sterilization done in the past, 26% patients had not used any contraception, 8% patients used barrier contraception, 6% were OCP user and 4% had used Cu-T as a contraceptive method.

Table No. 8 Distribution of Cases According to Hemoglobin Level

Hb	No. of Patients	%
<8	10	20
8-9	28	56
9-10	8	16
>10	4	8
Total	**50**	**100**

Out of total 92% patients had hemoglobin < 10 gm%. 56% of patients had hemoglobin level between 8-9 gm%.20% of cases had Hb level < 8 gm%. 16% of patients had Hb between 9-10 gm%. 8% of patients had Hb >10 gm%. It correlated with high incidence of anemia in patients with AUB.

Table No. 9 Diagnosis of Endometrial Findings in AUB Patients by Hysteroscopy

Endometrial Finding on Hysteroscopy	No. of Cases	Percentage
Normal	28	56%
Endometrial Hyperplasia	10	20%
Endometrial Polyp	8	16%
Sub mucosal Fibroid	4	8%
Total	**50**	**100%**

Table No. 9 shows hysteroscopic finding among AUB patient. It showed that out of 50 cases, 28/50 (56%) were normal and remaining 22/50(44%) showed abnormal endometrial finding, out of which Endometrial hyperplasia seen in (20%) cases, polyp in (16%) and sub mucosal fibroid in (8%) cases.

Table No. 10 Comparison of Hysteroscopy Findings with Histopathology

Hysteroscopy Findings	Total	Histopathological Finding				
		Normal	Endometrial Hyperplasia	Endometrial Polyp	Sub Mucosal Fibroid	Adenomyosis
Normal(proliferative/secretory)	28	22	3	0	0	3
Endometrial Hyperplasia	10	2	8	0	0	0
Endometrial Polyp	8	0	0	8	0	0
Sub Mucosal Fibroid	4	0	0	0	4	
Grand Total	**50**	**24**	**11**	**8**	**4**	**3**

Whilecomparing hysteroscopic findings with histopathology, Hysteroscopy showed 28 cases (56%) as normal finding. On histopathology out of these 28 cases; 22 cases had normal endometrial finding, 3 cases showed endometrial hyperplasia and 3 cases had adenomyosis. Diagnostic accuracy of hysteroscopy for normal endometrium (proliferative/ secretory) came out to be 90 %.

Out of 10 cases showing endometrial hyperplasia on hysteroscopy; in histopathology 8 cases had endometrial hyperplasia, 2 cases showed normal endometrium. Diagnostic accuracy of hysteroscopy for endometrial hyperplasia came out to be 84%.

8 cases of polyp were diagnosed by hysteroscopy. Same finding confirmed on histopathology in all 8 cases. Diagnostic accuracy of hysteroscopy for polyp came out to be 100%.

4 cases of sub mucosal fibroid diagnosed by hysteroscopy out of these all had fibroid on histopathology. One confirmed on histopathology (hysteroscopic myomectomy) and rest 3 was confirmed on hysterectomy specimen. So, considering final diagnosis, diagnostic accuracy of hysteroscopy was 100%.

After confirming the diagnosis, treatment was given to the patients

Table No. 11 True and False Findings of Hysteroscopy on Comparison with Histopathology

Endometrial Pathology	Hysteroscopy Findings			
	TP	TN	FP	FN
Normal (24)	22	20	6	2
Endometrial Hyperplasia (11)	8	37	2	3
Endometrial Polyp (8)	8	42	0	0
Sub Mucosal Fibroid (4)	4	46	0	0

Out of 11 cases of endometrial hyperplasia on histopathology, hysteroscopy identified 8 cases correctly as endometrial hyperplasia and 3 cases as normal endometrial finding leads to 3 false negative. Out of 8 cases of endometrial polyp on histopathology, hysteroscopy identified all 8 cases as true positive. Out of 4 cases of sub mucosal fibroid on hysteroscopy, hysteroscopy identified all 4 cases as true positive.

Table No. 12 Sensitivity, Specificity, PPV, NPV of Hysteroscopy

	Sensitivity	Specificity	PPV	NPV	Diagnostic accuracy
Normal	91.66	76.92	78.57	90.90	90%
Endometrial Hyperplasia	72.72	94.87	80	92.5	84%
Endometrial Polyp	100	100	100	100	100%
Sub Mucosal Fibroid	100	100	100	100	100%

Table no 12 showed that hysteroscopy has 100% sensitive and 100% specific for **endometrial polyp** and **sub mucosal fibroid** indicating that hysteroscopy is the best modality for diagnosing intrauterine pathologies.

The sensitivity, specificity, PPV, NPV for **Endometrial hyperplasia** came out to be 72.72%, 94.87%, 88.88%, 92.5% respectively. So, hysteroscopyis less sensitive for diagnosing Endometrial Hyperplasia.

The sensitivity, specificity, PPV, NPV for diagnosing **normal endometrium** came out to be 91.66%, 76.92%, 78.57% and 90.90% respectively

Discussion

Abnormal uterine bleeding is most common gynecological complaint among women in perimenopausal age group**.**

Distribution according to Age

In our study maximum(48%) no of cases were between age group of 40- 44yrs. and 38% of cases between age group of 45-49 yr. Mean age was 44.3 yr. This suggests abnormal uterine bleeding is common in perimenopausal women. Reethu Varadarajan et al[11] reported maximum number of cases (56.0 %) falling in the age group of 40 – 43 yrs. Urvashi Verma et al[13] also observed 41% of cases belonged to age group in 44 to 47 years.

Although around 80% of cases are attributed to anovulatory bleeding, a proportion of cases are because of structural, premalignant and malignant condition, hence a meticulous and systematic screening for the pathology is a must. Continuous evaluation of various non-invasive modalities of investigation procedures for perimenopausal bleeding should be undertaken.

Distribution According to Socioeconomic Status

In my study analysis according to socioeconomic status of the participants showed that most of them (56%) belonged to socioeconomic class III and 16% were from class IV. It was comparable to Urvashi Verma et al[13] who found that more than 50% belonged to socioeconomic class III and IV. Most of population in India belongs to lower socio-economic status class III, IV as per modified Kuppuswamy scale.

Distribution according to Parity- my study analysis revealed that most of patients were multiparous (94%).In the study by Jonathan Arnold et al[14] approximately 90% women were multiparous, similarly Dasgupta Subhankar et al[15]showed 88.5% patients being multiparous in their study, this is suggestive that multiparty and AUB may be correlated.

Distribution According to Bleeding Pattern

In our study, the most common bleeding pattern was **heavy menstrual bleeding** (50%) which was comparable to the study by **Shobha S. et al**[16]. They had 46.5% patients presenting with menorrhagia**.**

Saroj A. et al[17] also observed; menorrhagia (46.86%) being the most common menstrual complain. **Jonathan Arnold et al**[14] also reported Heavy menstrual bleeding (HMB) in maximum no. of cases (43.7%). **G.L. Shobhita et al**[18] showed menorrhagia in (40%) of cases.

Endometrial Finding on Hysteroscopy

In current study, hysteroscopic showed normal endometrium in 56% of patients and showed endometrial pathology in 44% cases.

Abnormal hysteroscopic findings were endometrial hyperplasia in 20% cases, polyp found in 16% cases and sub mucosal fibroid in 8% of cases. Sheetal et al[19], found hyperplasia in 18%, endometrial polyp 9%, and sub mucosal myoma 11%.

In our study the incidence of other pathological lesion such as polyp and sub mucosal fibroid were

comparable with the study by Veena B.T. et al[12]who detected sub mucus fibroid found in 6.7% and polyps in 15% of cases by hysteroscopy. Astudillo et al[20] and Sciarra JJ et al[21] also had similar distribution of the intra-cavitary lesions.

Out of 8 cases of endometrial polyp all 8 were diagnosed on hysteroscopy and all 4 cases of sub mucosal fibroid diagnosed by hysteroscopy were confirmed on histopathology. It showed that hysteroscopy has very high sensitivity (100%) and specificity (100%), diagnostic accuracy (100%) for intra uterine pathology such as polyp and sub mucosal fibroid.

Endometrial hyperplasia

In present study the sensitivity, specificity, PPV, NPV and diagnostic accuracy of hysteroscopy for **endometrial hyperplasia** was 72.72%, 94.87%, 88.88%, 92.5% and 84% respectively.

Sheetal et al[19] showed hysteroscopic diagnostic accuracy for **endometrial hyperplasia** 72%. Sensitivity, specificity, positive predictive value and negative predictive value of hysteroscopy for hyperplasia were 75%, 92.5%, 71.4% and 93.67%, respectively.

Loverro et al[22] stated the sensitivity, specificity, positive predictive value and negative predictive value was 98%, 95%, 63% and 99%, respectively, for endometrial hyperplasia.

Arslan et al[23] showed positive predictive value was 71.4% and negative predictive value was 95.4% in diagnosis of endometrial hyperplasia.

Endometrial polyp

In present study the sensitivity, specificity, PPV, NPV was 100% for polyp and sub mucosal fibroid in hysteroscopy. It correlates with the findings of Sheetal et al[19] in which sensitivity, specificity, positive predictive value and negative predictive value of hysteroscopy for endometrial polyp was 100%.

Haller et al[24] reported sensitivity and specificity of 100% and 96.7%, respectively. Panda et al[25] reported diagnostic accuracy of 100% in for polyp. Acharya V et al[26] had observed sensitivity and specificity of hysteroscopy for endometrial polyp as 100% each.

Chhikara et al[27] showed for endometrial polyps, the sensitivity and specificity being 88.8% and 97.5% respectively.

Submucous fibroid

The sensitivity and specificity of the procedure was 100% for sub mucous fibroids.

Panda et al[25], Acharya V et al[26] showed the sensitivity and specificity of hysteroscopy for sub mucous fibroid was 100%.

Sheetal et al[19] showed the sensitivity, specificity, positive predictive value and negative predictive value of hysteroscopy for fibroid was 100% each.

In conclusion, this study demonstrates thathysteroscopy remains the best option for the assessment of endometrium owing to its established accuracy. It allows direct visualization of the cavity and sampling for histopathological examination.

Overall efficacy of Hysteroscopy in Other Studies

Table-13

Study	Procedure	Sensitivity	Specificity	PPV	NPV
Urvashi et al[13]	Hysteroscopy	89.79	97.56	97.95	90.56
Ritu Mishra et al[28]	Hysteroscopy	78.3	84.7	85.4	81
Present study	Hysteroscopy	89.36	94.77	84.00	96.66

In the present study hysteroscopy had overall sensitivity, specificity, PPV, NPV 89.36%, 94.77%, 84% & 96.66%. The sensitivity, specificity, PPV, NPV of our study was fairly comparable with the study of Urvashi et al[50] & Ritu et al[73].

Conclusion

Abnormal uterine bleeding prevails as an important and common gynecological ailment. In my study, we concluded that out of all enrolled patients;48% had normal endometrium, and 52% had abnormal finding of which Endometrial Hyperplasia found in 22%, Polyp in 16%, Sub mucosal Fibroid in 8%, and adenomyosis in 6% of cases. The sensitivity, specificity, PPV, NPV of hysteroscopy was 89.36%, 94.77%, 84% & 96.66% respectively. Hysteroscopy showed 100%

diagnostic accuracy for intrauterine pathologies like polyp and submucous fibroid. The results showed that hysteroscopy is an important tool in the diagnosis of various endometrial and intrauterine lesions, with high sensitivity and specificity, and low false negativity. Hysteroscopy is a valuable, simple, low-risk technique which allows an adequate visualization of the entire uterine cavity and prompt diagnosis and treatment in the same sitting of specific intrauterine pathologies. Thus, Hysteroscopy can be considered a gold standard for diagnosis of intrauterine pathologies. It does not substitute other diagnostic procedures; rather it complements them.

For management of AUB patients we can go for screening with TVS followed hysteroscopic according to the pathology detected in TVS. Hysteroscopy should be done prior to subjecting the women with AUB to major operative procedures.

References

1. Vilos GA, Tureanu V, Garcia M, Abu-Rafea B. The levonorgestrel intrauterine system is an effective treatment in women with abnormal uterine bleeding and anticoagulant therapy. Journal of minimally invasive gynecology. 2009 Aug 31;16(4):480-4.
2. Speroff L, Fritz MA, editors. Clinical gynecologic endocrinology and infertility. lippincott Williams & wilkins; 2005.
3. Euro pub med central PMID-10524483, Oriel KA, Shrageers university of wiscouin school of Medicine, Madison 53715, USA. American family physician (1999, 6095):1371 -80; discussion 1381-2).
4. Munro MG, Critchley HO, Fraser IS, FIGO Menstrual Disorders Working Group. The FIGO classification of causes of abnormal uterine bleeding in the reproductive years.Fertility and sterility. 2011 Jun 30;95(7):2204-8.
5. Lefebvre G. Vilos, C. Allaire, J. Jeffrey. The management of uterine leiomyomas. Am J Obstet Gynecol, 2003;128:1–10.
6. Özdemir S, Çelik Ç, Gezginç K, Kıreşi D, Esen H. Evaluation of endometrial thickness with transvaginal ultrasonography and histopathology in premenopausal women with abnormal vaginal bleeding. Archives of gynecology and obstetrics. 2010 Oct 1;282(4):395-9.
7. Fleischer AC, Kalemeris GC, Machin JE, Entman SS, James AE. Sonographic depiction of normal and abnormal endometrium with histopathologic correlation.Journal of ultrasound in medicine. 1986 Aug 1;5(8):445-52.
8. Smith-Bindman R, Kerlikowske K, Feldstein VA, Subak L, Scheidler J, Segal M, Brand R, Grady D. Endovaginal ultrasound to exclude endometrial cancer and other endometrial abnormalities. Jama. 1998 Nov 4;280(17): 1510-7.
9. de Vries LD, Dijkhuizen FP, Mol BW, Brölmann HA, Moret E, Heintz AP. Comparison of transvaginalsonography, saline infusion sonography, and hysteroscopy in premenopausal women with abnormal uterine bleeding. Journal of clinical ultrasound. 2000 Jun 1;28(5):217-23..
10. Kotdawala P, Kotdawala S, Nagar N. Eevaluation of endometrium in peri-menopausal abnormal uterine bleeding. J Midlife Health. 2013 Jan-Mar; 4(1):16-21.
11. Varadarajan R, Sreekantha SM. Role of hysteroscopy in abnormal uterine bleeding in perimenopausal age group. Journal of Evolution of Medical and Dental Sciences. 2013 Mar 11;2(10):1504-9.
12. Veena BT, Shivalingaiah N. Role of transvaginalsonography and diagnostic hysteroscopy in abnormal uterine bleeding. Journal of clinical and diagnostic research: JCDR. 2014 Dec;8(12):OC06.

13. Verma U, Garg R, Singh S, Yadav P, Rani R. Diagnostic Approach in Perimenopausal Women with Abnormal Uterine Bleeding. Journal of SAFOMS. 2014 Jan 1;2(1):12.
14. Arnold JA, Saravanan S. A Two Year Clinicopathological Study of Non-Gravid Women with Abnormal Uterine Bleeding in A Rural Tertiary Care Centre in Tamilnadu: In Concurrence with The Figo Recommendations. Journal of Evolution of Medical and Dental Sciences-JEMDS. 2015Aug 6;4(63):10990-1000.
15. Dasgupta S, Chakraborty B, Karim R, Aich RK, Mitra PK, Ghosh TK. Abnormal uterine bleeding in peri-menopausal age: Diagnostic options and accuracy. The Journal of Obstetrics and Gynecology of India. 2011 Apr 1;61(2):189-94.
16. Pillai SS. Sonographic and histopathological correlation and evaluation of endometrium in perimenopausal women with abnormal uterine bleeding. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2014;3(1):113-7.
17. Bolde SA, Pudale SS, Pandit GA, Matkari PP. Histopathological study of endometrium in cases of abnormal uterine bleeding. Int J Res Med Sci. 2014; 2(4): 1378-1381.
18. Shobhitha GL, Kumari VI, Priya PL, Sundari BT. Endometrial Study by TVS and It's Correlation with Histopathology in Abnormal Uterine Bleeding. Journal of Dental and Medical Sciences. 2015;14(4):21-32.
19. Patil SG, Bhute SB, Inamdar SA, Acharya NS, Shrivastava DS. Role of diagnostic hysteroscopy in abnormal uterine bleeding and its histopathologic correlation. Journal of gynecological endoscopy and surgery. 2009 Jul; 1(2):98.
20. Neumann T, Astudillo J. Hysteroscopic study in patients with abnormal uterine bleeding. Revistachilena de obstetriciay ginecologia. 1993 Dec; 59(5): 349-52.
21. Sciarra JJ, Valle RF. Hysteroscopy: a clinical experience with 320 patients. American journal of obstetrics and gynecology. 1977 Feb 15; 127(4):340-8.
22. Loverro G, Bettocchi S, Cormio G, Nicolardi V, Porreca MR, Pansini N, et al. Diagnostic accuracy of hysteroscopy in endometrial hyperplasia. Maturitas. 1996; 25:187–91.
23. Arslan S, Aytan H, Gunyeli I, Koi O, Tuncay G, Tapisiz OL. Office hysteroscopic evaluation of endometrium: Can we hit the target. Arch Gynecol Obstet. 2004; 271:200–2.
24. Haller H, Matejčić N, Rukavina B, Krašević M, Rupčić S, Mozetič D. Transvaginalsonography and hysteroscopy in women with postmenopausal bleeding. International Journal of Gynecology & Obstetrics. 1996 Aug 31; 54(2):155-9.
25. Panda A, Parulekar SV, Gupta A. Diagnostic hysteroscopy in abnormal uterine bleeding and histopathological correlation. J Obstet Gynaecol India. 1999; 49:74–6.
26. Acharya V, Mehta S, Randar A. Evaluation of dysfunctional uterine bleeding by TVS: Hysteroscopy and Histopathology. J Obstet Gynecol. 2003; 53:170-77.
27. Chhikara A, Bharti A. Role of Hysteroscopy in the Evaluation of Abnormal Uterine Bleeding. Indian Journal of Applied Research. 2016 Jul 18; 6(6).
28. Mishra R, Misra AP, Mangal Y. To compare the result of TVS and SIS with hysteroscopy and histopathological examination in perimenopausal and postmenopausal bleeding. Journal of Evolution of Medical and Dental Sciences. 2015; 4(7):1230-1237.