



# Hysteropathological Correlation in Abnormal Uterine Bleeding in a Tertiary Care Hospital in South India

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## Abstract

**Background** Abnormal uterine bleeding is a common problem mainly encountered in reproductive age group and post-menopausal women. Hysteroscopy is a safe, simple, well tolerated and reliable procedure for the diagnosis of AUB across all age groups. The aim of the study is to determine the association of hysteroscopy and histopathologic examination (HPE) findings in abnormal uterine bleeding. The secondary objective of the study are to enumerate the hysteroscopy findings in patients with AUB and to evaluate the pattern of AUB.

**Materials and Methods** Observational cross-sectional study among 60 women in reproductive and post-menopausal age group presenting with features/symptoms suggestive of abnormal uterine bleeding were studied. All patients reporting in the outpatient department (OPD) and who are eligible to participate were included in the study, after obtaining written informed consent. Detailed history, Clinical examination, Ultrasound pelvis and endometrial thickness assessment is done. Hysteroscopic findings were compared against histopathological findings.

**Results** The various patterns of bleeding documented in our study population were menorrhagia, metrorrhagia, menometrorrhagia, polymenorrhagia, and post-menopausal bleeding. Out of these patterns, the commonest was menorrhagia at 50.0% and post-menopausal bleeding at 26.67%. In our study population, the various hysteroscopy findings were strawberry, tongue-shaped projections, pebble stones, polypoidal patterns, and cerebroid patterns. Out of these, the most common was a polypoidal pattern, strawberry pattern, and tongue-shaped projections with 45%, 31.67%, and 26.7%, respectively. The most common histopathology finding was secretory and proliferative constituting 35% and 26.67%, respectively. Carcinoma endometrium constitutes about 6.67% of the study population. The sensitivity, specificity, PPV, and NPV of strawberry appearance in hysteroscopy in comparison with secretory changes in histopathology were 52.38%, 79.49%, 57.89%, and 75.61%, respectively. The sensitivity, specificity, PPV, and NPV of tongue-shaped projections appearance in hysteroscopy in comparison with HPE findings was 60%, 76.36%, 18.75%, and 95.45%, respectively. The sensitivity, specificity, PPV, and NPV of polypoidal pattern in hysteroscopy in comparison with Endometrial hyperplasia in histopathology was 66.67%, 56.14%, 7.41%, and 96.97%, respectively. The sensitivity, specificity, PPV, and NPV of cerebroid appearance in hysteroscopy in comparison with carcinoma endometrium in histopathology were 75.0%, 100%, 100%, and 98.25%, respectively. This correlation of cerebroid pattern with carcinoma endometrium was highly significant. Among all correlations, the highly reliable was in Carcinoma endometrium followed by endometrial polyps.

**Conclusion** Hysteroscopy has high sensitivity and specificity in diagnosing intrauterine pathology especially endometrial cancer followed by endometrial polyps. Among the various patterns of abnormal uterine bleeding, menorrhagia was the most common. A combination of hysteroscopy and endometrial sampling was found to increase diagnostic accuracy in patients with abnormal uterine bleeding and will effectively guide us in planning the appropriate management for these patients.

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**Keywords** Abnormal uterine bleeding · Hysteroscopy · Intrauterine pathology · Endometrial hyperplasia · Carcinoma endometrium

## Introduction

Abnormal uterine bleeding is a common problem mainly encountered in reproductive age group and post-menopausal women. It is one of the leading causes for seeking gynecological advice. In peri-menopausal age group in particular, 70% of all gynecological consultations are for abnormal uterine bleeding [1]. It attributes for 25% of total gynecological surgeries performed [2, 3]. About 30% of women seek medical assistance for Abnormal Uterine Bleeding (AUB) during their reproductive age group and about one third of hysterectomies are carried out for AUB alone. Numerous other local, systemic, and drug-related illnesses can result in AUB.

FIGO has classified AUB into nine main categories, which are arranged according to the acronym PALM-COEIN: Polyp; Adenomyosis; Leiomyoma; Malignancy and hyperplasia; Coagulopathy; Ovulatory dysfunction; Endometrial; Iatrogenic; Not yet classified [2]. The key to successful management of abnormal uterine bleeding is to identify the cause behind it for which proper evaluation of the case is necessary. Problem is evaluated by careful history taking, physical examination and investigations [5]. Though clinical evaluation provides the foundation, contemporary work-up also relies on diagnostic procedures. Determining the exact cause has important implications on the therapeutic decisions also. Hysteroscopy, which was developed, now offers a minimally invasive solution to common gynecologic issues like AUB. It is a safe, simple, well tolerated and reliable procedure for the diagnosis of AUB across all age groups [6, 7]. It has the potential to drastically reduce the need for conventional dilatation and curettage, thereby provides increased patient satisfaction and lowering costs. Hysteroscopy provides direct visualization of the endometrial cavity, thereby allowing targeted biopsy or excision of lesions identified during the procedure [8, 9]. Despite being the gold standard for diagnosing AUB, hysteroscopy is more expensive, intrusive, and needs more training than other imaging techniques. This study was conducted with the aim of determining the association of hysteroscopy and histopathology findings in abnormal uterine bleeding.

## Material and Methods

The study present was conducted in the department of Obstetrics and Gynecology, in a tertiary care teaching Institute, in a coastal area in Puducherry, South India. The

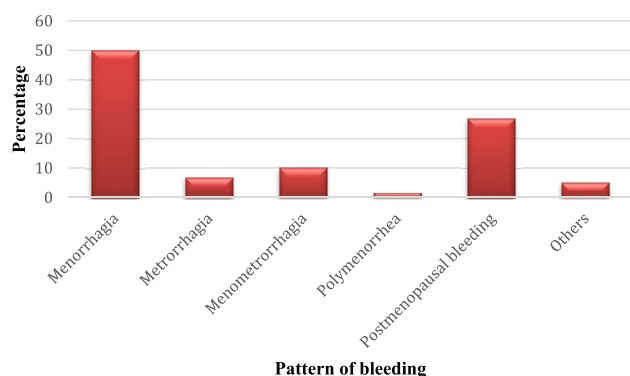
study was carried out as an observational cross-sectional study among 100 women during the period November 2019 to November 2021. Women in reproductive and post-menopausal age group (18–65 years) presenting to/referred to the department of gynecology with features/symptoms suggestive of abnormal uterine bleeding, fulfilling the inclusion criteria comprised the study population. Institute ethical committee approval was obtained before the study was begun. The minimum required sample size was calculated to be 59, using the software Epi Info 7, considering the primary objective of the study conducted by Sinha et al. [4] where the positive findings in hysteroscopy were noted in 53.6% of the patients, for a relative precision of 33%, alpha error of 5% and power of 80%. All patients reporting in the outpatient department (OPD) and who are eligible to participate were included in the study, after obtaining written informed consent, till the required sample size was achieved, there was no requirement for a sampling technique. Women with pregnancy related conditions, suspected pelvic inflammatory disease and those diagnosed with genital tract malignancies were excluded from the study. Detailed history was obtained including the demographic data, presenting complaints, date of last menstrual period, age of menarche, duration of each cycle, Regularity of cycle, amount of blood loss and pattern of bleeding. Past medical and surgical history were elicited from the patient. Specific drug history—intake of anti-fibrinolytics, oral contraceptive pills, progesterone containing pills, or any other treatment history was obtained. Examination of the general condition, abdomen and per vaginum examination was done. Basic investigations required preoperatively like blood grouping and Rh typing, hemogram, urine examination, serology required preoperatively done. Ultrasound Pelvis and endometrial thickness assessment was done. After getting informed consent & preoperative requisites for the procedure, diagnostic hysteroscopy was performed. Based on the appearance of the endometrium on hysteroscopy, it was classified as follows: (i) Starry sky: Atrophic endometrium, (ii) Strawberry: Secretory endometrium, (iii) Tongue shaped projections: Endometrial polyps, (iv) Pebble stones: Myomatous polyps, (v) Polypoidal pattern: Endometrial hyperplasia and (vi) Cerebroid pattern: Endometrial carcinoma. Hysteroscopic appearance and any intracavitary lesions like endometrial polyps, submucous myoma or growths are documented and if required hysteroscopy guided biopsy was obtained. Subsequently, a blind curettage was done using endometrial curette and the endometrium was sent for histopathological examination (HPE). A predesigned semi- structured proforma was used for data collection.

Data entry was done using MS excel sheet and data analysis done using IBM SPSS (Statistical Package for Social Sciences) software version 20 Armonk, NY: Difference in proportions and associations was tested using Chi Square test. A  $p$  value  $< 0.05$  was considered statistically significant.

## Results

Majority of the study participants were in the age group of 41–50 years and 51–60 years with 43.4% and 31.7%, respectively. 5% of the population were between 21 and 30 years. The commonest age for menarche in our study population was 13 years and 14 years with 46.67% and 23.33%, respectively. Most of study participants were multiparous, out of which 65% had a parity of 2 followed by 23.33% who had a parity of  $\geq 3$ . Majority of the study participants were obese type I and II with 41.67% and 45%, respectively. Hence it is evident that in our population most of them had obesity. The common presenting symptom of the study participants were heavy menstrual bleeding with 65% followed by postmenopausal bleeding 23.4%. The various patterns of bleeding documented in our study population were menorrhagia, metrorrhagia, menometrorrhagia, polymenorrhea and postmenopausal bleeding. Out of these patterns, the most commonest was menorrhagia with 50.0% and postmenopausal bleeding with 26.67% (Fig. 1). Nearly 36.7% of the study participants presented with symptoms of dysmenorrhea. Nearly 13.3% of study participants had history of antifibrinolytics usage and history of intake of progesterone pills. Only 5% of study participants had history of oral contraceptive pill usage (Table 1).

On speculum examination, the findings were normal in 81.67% of patients. The other findings were: cervical erosion, curdy white discharge, cervix hypertrophy, cystocele, rectocele, watery discharge, nabothian cyst and cervical polyp. Cervical erosion was seen in 11.67% of study population; cervical hypertrophy and nabothian cyst in



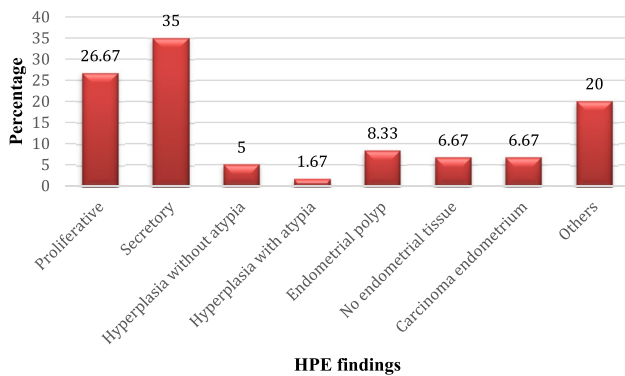
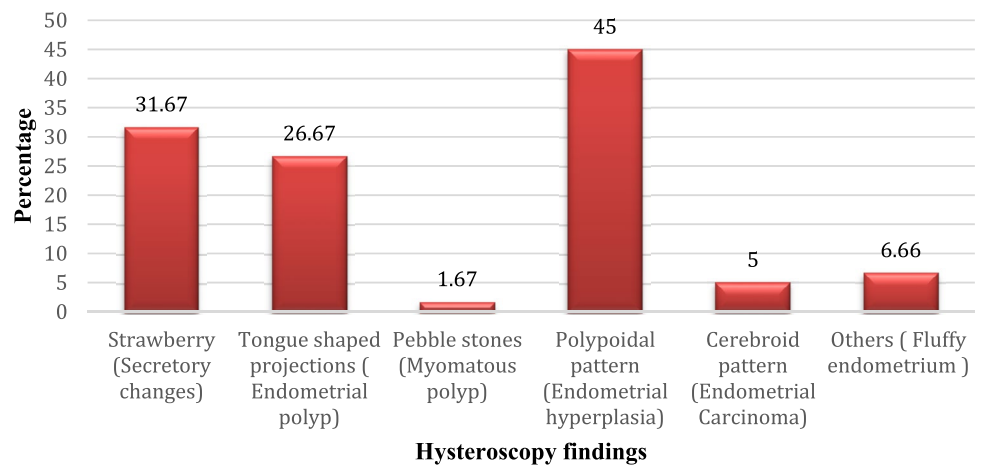
**Fig. 1** Distribution of study participants based on pattern of bleeding

**Table 1** Distribution of study participants based on baseline characteristics ( $n=60$ )

Parameter	Frequency	Percentage
<i>Age (in years)</i>		
21–30	3	5.00
31–40	11	18.3
41–50	26	43.4
51–60	19	31.7
61–70	1	1.6
<i>Age at Menarche (in years)</i>		
11	1	1.67
12	11	18.33
13	28	46.67
14	14	23.33
15	5	8.33
16	1	1.67
<i>Parity</i>		
Nullipara	3	5.00
1	4	6.67
2	39	65.00
$\geq 3$	14	23.33
<i>BMI Classification</i>		
Underweight	1	1.67
Normal	5	8.33
Overweight	2	3.33
Obese I	25	41.67
Obese II	27	45.00
<i>Presenting Symptoms</i>		
Heavy menstrual bleeding	39	65.00
Postmenopausal bleeding	14	23.4
Irregular menstrual cycles	7	11.67
<i>Pattern of bleeding</i>		
Menorrhagia	30	50.00
Metrorrhagia	4	6.67
Menometrorrhagia	6	10.00
Polymenorrhea	1	1.67
Postmenopausal bleeding	16	26.67
Others	3	5.00
Dysmenorrhoea	22	36.7
H/O Antifibrinolytics use	8	13.33
Oral contraceptive use	3	5.00
Progesterone pills	8	13.33
Total	60	100.00

6.67%; curdy white discharge and cervical polyp in 3.3% of study population. On bimanual examination the most common findings were uniformly enlarged uterus and irregularly enlarged uterus with fibroid constituting 26.67% and 16.67%, respectively. In Ultrasound pelvis study, majority of the study population were fibroid uterus and thickened endometrium—pre- and post-menstrual with 37.1%, 27.5%

**Fig. 2** Distribution of study participants based on hysteroscopy findings

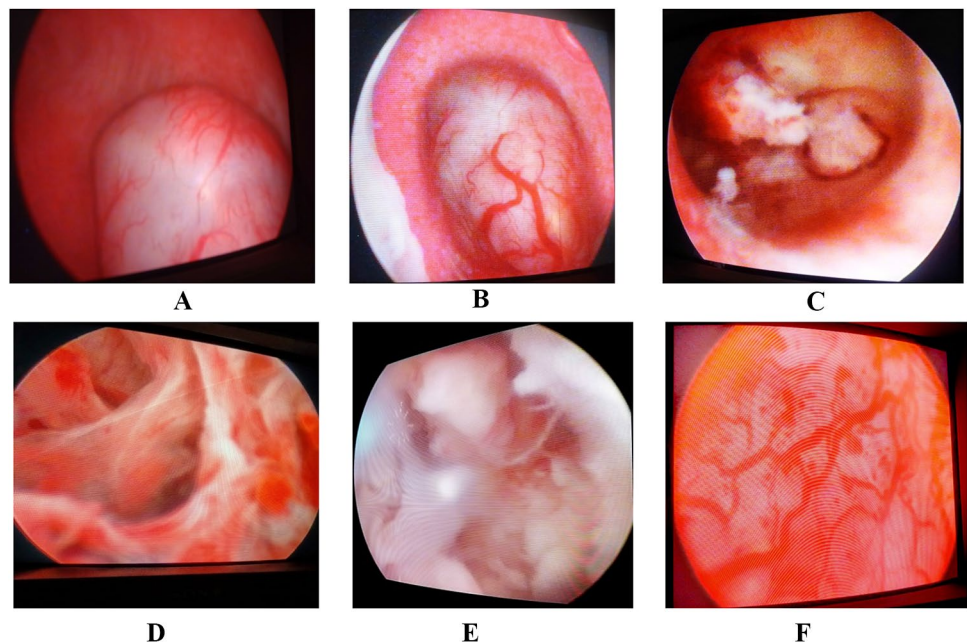


**Fig. 3** Distribution of study participants based on HPE findings

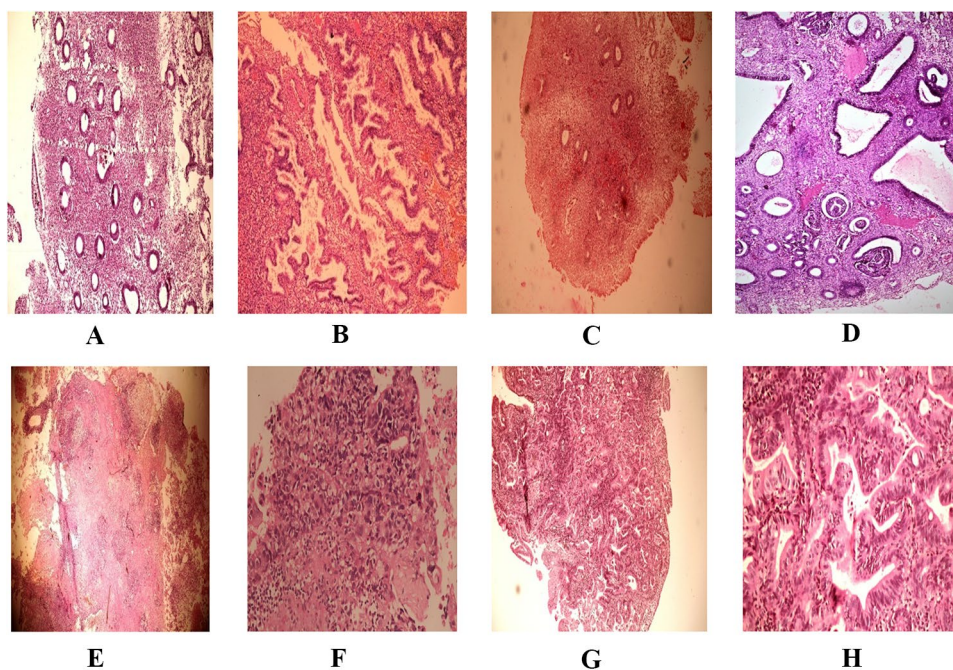
and 27.2%, respectively. In our study population, the various hysteroscopy findings were strawberry, tongue shaped projections, pebble stones, polypoidal pattern and cerebroid pattern. Out of these the most common were polypoidal pattern, strawberry pattern and tongue shaped projections with 45%, 31.67% and 26.7%, respectively (Figs. 2, 4). In our study population, the most common histopathology finding was secretory and proliferative constituting 35% and 26.67%, respectively. Carcinoma endometrium constitutes about 6.67% of study population (Figs. 3, 5) (Table 2).

The sensitivity, specificity, PPV, NPV of strawberry appearance in hysteroscopy in comparison with secretory changes in histopathology was 52.38%, 79.49%, 57.89% and

**Fig. 4** The hysteroscopic images show: **A** and **B** endometrial polyp: tongue shaped appearance in hysteroscopy, **C** submucous fibroid-pebble stone appearance in hysteroscopy, **D** endometrial hyperplasia-polypoidal appearance in hysteroscopy, **E** and **F** Carcinoma endometrium- cerebroid changes in hysteroscopy



**Fig. 5** The histopathology images show: **A** Proliferative endometrium, **B** Secretory endometrium, **C** Endometrial polyp, **D** Endometrial hyperplasia without atypia, **E** and **F** Malignant Mixed Mullerian Tumor-Low power and High power, respectively, **G** and **H** Well Differentiated Endometrioid Carcinoma-low power and high power, respectively



75.61%, respectively. The sensitivity, specificity, PPV, NPV of tongue shaped projections appearance in hysteroscopy in comparison with HPE findings was 60%, 76.36%, 18.75% and 95.45%, respectively. The sensitivity, specificity, PPV, NPV of polypoidal pattern in hysteroscopy in comparison with Endometrial hyperplasia in histopathology was 66.67%, 56.14%, 7.41%, 96.97% respectively. The sensitivity, specificity, PPV, NPV of cerebroid appearance in hysteroscopy in comparison with carcinoma endometrium in histopathology were 75.0%, 100%, 100% and 98.25%, respectively. This correlation of cerebroid pattern with carcinoma endometrium was highly significant. Among all correlations, highly reliable was in Carcinoma endometrium followed by endometrial polyps. No complications were encountered in the study (Table 3).

## Discussion

Premenopausal female patients with AUB constitute a large proportion of gynecological consultations often resulting in a variety of tests being ordered. Most common pathologies causing AUB in premenopausal patients are sub mucous fibroids, adenomyosis, endometrial polyps, and endometrial hyperplasia. Hysteroscopy offers the advantage of direct visualization of the uterine cavity while giving the option of collecting histological biopsy samples under visual control. Accurate diagnosis of the etiological cause may result in treatment directed at the specific pathology and may avoid major surgery. Hysteroscopy has revolutionized the diagnostic approach for intra-cavity uterine pathologies [10].

A number of specific technical problems like difficulty in distending the uterine cavity, the friable nature of uterine mucosa, mandatory use of anesthesia impeded the progress of hysteroscopy [11]. In recent years, hysteroscopy techniques has been upgraded allowing diagnostic hysteroscopy to be performed in OPD setting without using anesthesia. Office hysteroscopy uses new miniature endoscopes with a diameter of 2.9 mm and 4 mm for diagnostic purposes [12]. Complex pathologies such as uterine malformation, intra-cavity adhesions, myomas and dysfunctional uterine bleeding have been included in the capacity of endoscopic procedures. Traditional surgical procedures like dilatation and curettage, metroplasty and hysterectomy have been replaced in a significant degree by hysteroscopy [13]. Hence finding the appropriate diagnosis will avoid major gynecological surgeries.

The most common presenting complaint was menorrhagia with 65%, followed by post-menopausal bleeding (23.4%) and least was irregular menstrual bleeding with 11.67%. Similar trend was documented in the study conducted by Bahadur et al. [14] and Panda et al. [15] Endometrial polyp are usually seen in peri-menopausal age group with lower prevalence in younger age group [16]. Similar trend is documented in our study too, as majority of polyp patients belonged to 40–60 years. One of the main cause for abnormal uterine bleeding is polyps. These polyps are found in 15–25% of infertile women, with exophytic mucous lesions which may be presenting with varying shape, size, number and appearance and might be sometimes associated with glandular hyperplasia [17]. A study conducted by Pradhan et al. [18] showed the diagnostic sensitivity for endometrial

**Table 2** Distribution of study participants based on clinical presentation ( $n = 60$ )

Parameter	Frequency	Percentage
<i>Perspeculum findings</i>		
Normal	49	81.67
Cervical erosion	7	11.67
Curdy white discharge	2	3.33
Cervix hypertrophy	4	6.67
Cystocele	1	1.67
Rectocele	2	3.33
Watery discharge	1	1.67
Nabothian cyst	4	6.67
Cervical polyp	2	3.33
<i>Findings on bimanual examination</i>		
Normal	38	63.33
Uniformly enlarged uterus	16	26.67
Irregularly enlarged uterus with fibroid	10	16.67
Adnexal mass	2	3.33
Retroverted uterus	3	5.00
<i>USG findings</i>		
Normal finding	9	15.00
Fibroid uterus	23	38.33
Adenomyosis	4	6.67
Thickened endometrium	15	25.00
Adnexal mass	4	6.67
Endometrial polyp	5	8.33
Fluid in endometrial cavity	1	1.67
PCOS	1	1.67
<i>Hysteroscopy Findings</i>		
Strawberry (Secretory changes)	19	31.67
Tongue shaped projections (Endometrial polyp)	16	26.67
Pebble stones (Myomatous polyp)	1	1.67
Polypoidal pattern (Endometrial hyperplasia)	27	45.00
Cerebroid pattern (Endometrial Carcinoma)	3	5.00
Others ( Fluffy endometrium)	4	6.66
<i>HPE Findings</i>		
Proliferative	16	26.67
Secretory	21	35.00
Hyperplasia without atypia	3	5.00
Hyperplasia with atypia	1	1.67
Endometrial polyp	5	8.33
No endometrial tissue	4	6.67
Carcinoma endometrium	4	6.67
Others	12	20.0

polyp as 62% whereas studies conducted by Haller et al. [19] Anuradha Panda [20] showed 100% sensitivity but Valle [21] and Seth et al. [22] showed sensitivity as 88.6% and 81.8%, respectively. In our study, the prevalence of tongue shaped projections seen through hysteroscopy was 26.7%

which showed sensitivity of 71.43%. Hence our study is in concordance with study conducted by Pradhan et al. [18] where the sensitivity for endometrial polyp was 66.7% which is almost same as our study finding. In our study, the strawberry pattern of secretory endometrium was in accordance with the hysteroscopic findings of Pandey et al. [25] In our study, the secretory phase is seen in nearly 35% of population whereas the study conducted by Gitika Hyanki et al. [23] showed a prevalence of 29% and Patil et al. [24] showed a prevalence of 22%. A study conducted by Patil et al. [24] showed that the sensitivity, specificity, PPV and NPV was 54.45%, 93.58%, 70.58% and 87.95% whereas in our study the sensitivity, specificity, PPV and NPV was 52.38%, 79.49%, 57.89% and 75.61%, respectively, which was in concordance with our study findings. And another study conducted by Pandey et al. [25] showed 100% sensitivity, specificity, PPV and NPV which was contrary to our study and other studies. However, diagnostic hysteroscopy cannot establish a definitive diagnosis of adenomyosis, considering that its field of vision is restricted to the endometrial surface layer.

The following aspects are generally indicative of the pathological condition:

- (i) irregular endometrium with tiny openings seen on the endometrial surface.
- (ii) Pronounced hypervascularization;
- (iii) An endometrial "strawberry" pattern.
- (iv) Fibrous cystic appearance of intrauterine lesions (following 3–5 episodes of intramyometrial hemorrhage).
- (v) Hemorrhagic cystic lesions assuming a dark blue or chocolate brown appearance

In hysteroscopy, hyperplasia was considered as polypoidal pattern in our study. A research work conducted by Patil et al. [24] showed sensitivity and specificity as 75% and 92.5%, respectively, Loverro et al. [26] showed 98% and 95% and Pandey et al. [25] showed 85.7% and 88.4%. In our study the sensitivity and specificity was 66.67% and 56.14% which was in concordance with studies conducted by Shazia Saed et al. [27], Krishnamoorthy et al. [28], and Valle et al. [21]. The diagnostic accuracy of submucous myoma in our study was less because the prevalence was only 1% and was not picked up in hysteroscopy. Studies done by Edwin et al. [29] showed sensitivity of 25%. Studies done by Panda et al. [15] Ashok et al. [30] and Elfayomy et al. [31] reported a sensitivity 100%, 100% and 94.7%, respectively. The prevalence of proliferative changes in endometrium in our study was 26.7% whereas in studies conducted by Gitika Hyanki et al. [23] was 20% which was in concordance with our study and other studies conducted by Doriswami et al. [32].

A recent meta-analysis clarified the controversy that dissemination of tumor cells during hysteroscopy will not alter

**Table 3** Accuracy of hysteroscopy in comparison with HPE findings

Diagnosis	Strawberry appearance (Secretory endometrium)	Tongue shaped (endometrial polyps)	Polypoidal (Endometrial hyperplasia)	Cerebroid (Carcinoma endometrium)
Sensitivity	52.38%	60.00%	66.67%	75.00%
Specificity	79.49%	76.36%	56.14%	100.00%
Positive likelihood ratio	2.55	2.54	1.52	
Negative likelihood ratio	0.60	0.52	0.59	0.25
Positive predictive value (PPV)	57.89%	18.75%	7.41%	100.00%
Negative predictive value (NPV)	75.61%	95.45%	96.97%	98.25%
Accuracy	70.00%	75.00%	56.67%	98.33%

the staging of the tumor or prognosis of the patient [33]. The carcinomatous changes are visualized as hyperplasia with polypoidal growth with areas of hyperemia, ulceration, hemorrhage are labelled as cerebroid appearance in hysteroscopy. The sensitivity in our study finding was 75% whereas the studies conducted by Pandey et al. [15] showed sensitivity as 80%, Patil et al. [24] was 100% and Haller et al. [19] was 50% which was not in concordance with our study findings. With regards to specificity, our study findings showed 100% which was in par with Pandey et al. [25] Mencaglia [34], Valle et al. [21] and Panda et al. [15]. In some cases, there are more than one pattern of hysteroscopic finding in a single histopathological diagnosis. Possible limitation of the present study is that the study had a small sample size because of the pandemic situation.

## Conclusion

Hysteroscopy has high sensitivity and specificity in diagnosing intrauterine pathology especially endometrial cancer followed by endometrial polyps. Among the various patterns of abnormal uterine bleeding, menorrhagia was the most common. Hysteroscopic pattern recognition is a useful concept to triage women who require sampling for histopathological diagnosis. Although the feasibility of hysteroscopy as a one “stop diagnosis” method is still debated, in all cases, endometrial sampling should be obtained during the procedure to confirm the diagnosis. A combination of hysteroscopy and endometrial sampling was found to increase the diagnostic accuracy in patients with abnormal uterine bleeding and will effectively guide us in planning the appropriate management for these patients.

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## Declarations

**Conflict of interest** This is an original article based on an observational cross-sectional study performed at the Pondicherry Institute of Medical Sciences, Puducherry, India. The authors declare that there is no conflict of interest related to this work.

**Ethical approval** The study was performed in line with the principles of the 1964 Declaration of Helsinki and its later amendments. Ethical approval was provided by the Pondicherry Institute of Medical Sciences Institutional Ethical Committee (ref. IEC:RC/19/102).

**Informed consent** Informed written consent was obtained from all the participants for being included in the study.

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