

Role of Diagnostic Hysteroscopy and Hysteroscopic-guided Biopsy in Cases of Abnormal Uterine Bleeding: An Observational Study

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ABSTRACT

Introduction: Abnormal Uterine Bleeding (AUB) is one of the most common gynaecological complaints which affects the physical, social health of the patient. Around 33% of women referred to gynaecological outpatient clinics have AUB. Hysteroscopy is a minimally invasive intervention that usually offers an opportunity for simultaneous treatment and guided biopsy.

Aim: To evaluate the role of diagnostic hysteroscopy in evaluating uterine cavity in cases of AUB and its correlation with histopathological findings.

Materials and Methods: This observational study was conducted at Department of Obstetrics and Gynaecology, Uttar Pradesh University of Medical Sciences (UPUMS), Saifai, Etawah, Uttar Pradesh, India, from July 2021 to June 2023 and included a total of 60 patients, aged 20-70 years, with AUB on predefined inclusion and exclusion criteria. Hysteroscopy was done in all cases and attempts were made to diagnose the underlying causes by direct visualisation of different endometrial pattern and many undiagnosed intrauterine pathologies. The

samples were taken for Histopathology Examination (HPE) and HPE reports were correlated with the findings of hysteroscopy. The sensitivity, specificity, diagnostic accuracy were also calculated.

Results: Most of patients were in age group 41-50 years and the most common clinical presentation was Heavy Menstrual Bleeding (HMB). Hysteroscopy has high sensitivity and specificity for diagnosis of all intrauterine pathologies. It has low sensitivity but high specificity for diagnosis of normal proliferative endometrium and secretory endometrium. The overall sensitivity, specificity Positive Predictive Value (PPV), Negative Predictive Value (NPV) and diagnostic accuracy of endometrial pathology was 93.1%, 80%, 81.8% 92.3% and 86.4%, respectively.

Conclusion: The present study concludes that hysteroscopy is a reliable diagnostic tool for the assessment of intrauterine pathologies, especially focal ones such as endometrial and endocervical polyps and submucous myomas, as these are often missed by blind endometrial curettage.

Keywords: Heavy menstrual bleeding, Histopathological examination, Proliferative endometrium

INTRODUCTION

The AUB may be defined as "any variation from the normal menstrual cycle that includes changes in regularity and frequency of menses, duration of flow, or amount of blood loss". Under this category of AUB, further definitions may be subdivided based on the volume of blood loss during menstruation, regularity, frequency, duration, chronicity and timing related to reproductive status [1]. AUB adversely affects the quality of life and, consequently, impairs their overall productivity and daily functioning [2].

The AUB is one of the most common gynaecological complaints with which a patient reports to the hospital. Around 33% of women referred to gynaecological outpatient clinics have AUB and this proportion increases to 69% in a perimenopausal or postmenopausal age [3]. Besides, 25% of gynaecologic surgeries involve AUB [4]. International Federation of Gynaecology and Obstetrics (FIGO) has classified its aetiology into nine main categories, which are arranged according to the acronym PALM-COEIN: Polyp; Adenomyosis; Leiomyoma; Malignancy and Hyperplasia; Coagulopathy; Ovulatory Dysfunction; Endometrial; Iatrogenic; and Not yet classified (PALM-COEIN). In general, the components of the PALM group are structural entities that can be measured visually with imaging techniques and/or histopathology, whereas the COEIN group is related to entities that are not defined by imaging or histopathology (non structural) [5].

Out of the various diagnostic techniques, for many years, dilatation and curettage, which is a blind procedure, has been the gold

standard for evaluating patients with AUB. Although the diagnosis may be obtained by this method in most patients, yet about 10% of patients, focal pathology may be missed, which may be premalignant or malignant [6,7].

Other diagnostic techniques used in AUB are transvaginal sonography, saline infusion Sono-hystero-graphy and endometrial sampling, etc., Ultrasonography (USG) clearly shows the uterine contour and status of the ovary, but even, transvaginal sonography fails to provide adequate information regarding the endometrium and intrauterine pathology.

Hysteroscopic evaluation provides direct visualisation and assessment of the endocervical and uterine cavities, hence proving a beneficial method for diagnosing intrauterine focal abnormalities [8]. Hysteroscopy has almost replaced the standard Dilatation and Curettage (D and C) procedure for the management of AUB, as it is a minimally invasive intervention that also usually offers an opportunity for simultaneous treatment [9].

Hence, the present study aimed to evaluate the role of diagnostic hysteroscopy in evaluating uterine pathologies in patients with AUB and its correlation with histopathological findings.

MATERIALS AND METHODS

The present study was an observational study, conducted in the Department of Obstetrics and Gynaecology at (UPUMS), Saifai, Etawah, Uttar Pradesh, India from July 2021 to June 2023. Written

informed consent was obtained from all the participants before conducting the study. The approval to conduct the present study was obtained from the Institutional Ethical Committee (IEC) no 126/2019-20.

Sample size calculation: N (minimum sample size) = $z^2 \alpha / 2 P (1-p) / d^2$

A predetermined sensitivity (P) of 85% was assumed, which was ascertained by clinician experience/judgement.

Absolute precision (d) of 9%. Based on these parameters, the minimum required sample size was 60.

Inclusion and Exclusion criteria: A total of 60 women who presented in the gynaecology Outpatient Department (OPD) with the complaint of AUB during the study period, aged 20 to 70 years were included in the study. Exclusion criteria were clinically palpable pelvic pathology (large fibroid uterus, adnexal masses), active genital tract infections, known cervical, uterine, or ovarian malignancy, a recent history of uterine perforation and haematological diseases (idiopathic Thrombocytopenic purpura, coagulation disorders, leukaemia). Patients on oral contraceptive pills, hormone replacement therapy, or tamoxifen were also excluded from the study.

Study Procedure

Enrolled patients underwent detailed history, examination and investigations, including a pap smear and USG. Hysteroscopy was performed in all patients from day 6 to day 10 of the menstrual cycle in patient who had regular cycles; and any day irrespective of menstrual cycles, where cycles were grossly irregular or patients came with continuous bleeding per vaginum.

Patients were admitted for hysteroscopy a day before the procedure and kept nil per orally on the day of hysteroscopy. Tab misoprostol 400 mcg was put per vaginally four hours before the procedure. Injection tetanus toxoid and injection Ampicillin 500 mg i.v. were given to all patients before the procedure.

Under general anaesthesia, hysteroscopy was performed (with a rigid hysteroscope 4 mm with continuous flow sheath (inner and outer), by using Glycine as a distending medium) in all the cases. A systematic survey -observation of cervix, endocervix, uterine fundus, endometrial cavity, right and left Cornue and both tubal orifices- was visualised and interpreted accordingly. Following hysteroscopy, a "guided biopsy" was taken from the suspected site, followed by curettage of the whole uterine endometrium. Tissue was collected in formalin solution and sent for HPE. Findings of Hysteroscopy were correlated with histopathology evaluation.

The patients were monitored in the postoperative period for complications and most were discharged either in the evening or the following morning with clear follow-up instructions.

STATISTICAL ANALYSIS

Data were collected and entered into a Microsoft Excel worksheet and the results were analysed using Statistical Package for the Social Sciences (SPSS) software version 24. For statistical analysis, categorical data were presented as frequencies and percentages. Sensitivity, specificity, PPV, NPV and overall diagnostic accuracy were calculated from a 2x2 contingency table.

RESULTS

In the present study, the mean age of the patients was 44.22 ± 8.84 years, in which 23 (38.3%) of patients belonged to the 41 to 50 years age group followed by 31 to 40 years which constituted about 18 (30%) of the women [Table/Fig-1].

HMB was the most common clinical presentation (35%) (n=21) followed by postmenopausal bleeding in 14 (23.3%). 9 (15%) of patients presented with irregular bleeding while 10% had intermenstrual bleeding [Table/Fig-2].

| Age group | n (%) |
|---------------------|-------------|
| 20-30 years | 3 (5.0) |
| 31-40 years | 18 (30.0) |
| 41-50 years | 23 (38.3) |
| 51-60 years | 14 (23.3) |
| 60-70 years | 2 (3.3) |
| Total | 60 (100.0) |
| Mean±Std. deviation | 44.22±8.839 |

[Table/Fig-1]: Distribution of patients according to age group.

| Bleeding pattern | n (%) |
|---|------------|
| Heavy Menstrual Bleeding (HMB) | 21 (35.0) |
| Post Menstrual Bleeding (PMB) | 14 (23.3) |
| Irregular Bleeding (IRREG) | 9 (15.0) |
| Inter Menstrual Bleeding (IMB) | 6 (10.0) |
| Heavy And Prolonged Menstrual Bleeding (HPMB) | 4 (6.7) |
| Frequent And Heavy Menstrual Bleeding (FHMB) | 3 (5.0) |
| Frequent Bleeding (FREQ) | 2 (3.3) |
| Light Menstrual Bleeding (LMB) | 1 (1.7) |
| Total | 60 (100.0) |

[Table/Fig-2]: Distribution of patients according to bleeding pattern.

On per vaginal examination, normal uterine size was observed among 33 (55%), of cases, followed by 6-10 week size in 26 (43.3%) and more than 10 weeks was observed in 1 (1.7%) [Table/Fig-3].

| Uterine size | n (%) |
|--------------|------------|
| Normal | 33 (55.0) |
| 6-10 weeks | 26 (43.3) |
| >10 weeks | 1 (1.7) |
| Total | 60 (100.0) |

[Table/Fig-3]: Frequency distribution of uterine size.

The findings on hysteroscopy, out of 60 cases, normal endometrium was found in 26 (43.3%) of cases, out of which 18 (30%) were proliferative and 8 (13.3%) were secretory is depicted in [Table/Fig-4]. Endometrial hyperplasia was observed in 12 (20%) of cases and endometrial polyp in 10 (16.7%) of cases. Together, these constituted 22 (36.7%). Endometrial carcinoma was present in 2 (3.3%) of cases. The other findings were endocervical polyp in 2 (3.3%), submucous myoma and atrophic endometrium in 3 (5%) each, endometrial synechiae in 1 (1.7%) and intrauterine copper device in 1 (1.7%). The patient was unaware of the intrauterine copper device insertion (diagnosed on ultrasonography) which was removed by hysteroscopy in the same sitting.

| Hysteroscopic findings | n (%) | |
|--|---------------|-----------|
| Normal | Proliferative | 18 (30.0) |
| | Secretory | 8 (13.3) |
| Endometrial hyperplasia | 12 (20.0) | |
| Endometrial polyp | 10 (16.7) | |
| Endocervical polyp | 2 (3.3) | |
| Submucous myoma | 3 (5.0) | |
| Atrophic endometrium | 3 (5.0) | |
| Endometrial carcinoma | 2 (3.3) | |
| Endometrial synechiae | 1 (1.7) | |
| (Unknown) Intrauterine Contraceptive Device (IUCD) | 1 (1.7) | |
| Total | 60 (100.0) | |

[Table/Fig-4]: Hysteroscopic findings.

Histopathological findings: Endometrial biopsy was conducted in 59 cases out of 60. In one case biopsy was not required because

of the presence of IUCD. Out of 59 cases, normal endometrium was found in 30 (50.8%) cases of which proliferative was found in 20 (33.9%) cases and secretory in 10 (16.9%). The most common abnormality was endometrial hyperplasia 12 (20.3%) followed by endometrial polyp 8 (13.6%), which together constituted 20 (33.9%). Endometrial carcinoma was diagnosed in 2 (3.4%). Other findings like endocervical polyp, atrophic endometrium and tubercular endometrium were diagnosed in 2 (3.4%) each and submucous myoma in 1 (1.7%) [Table/Fig-5].

| Histopathological findings | | n (%) |
|----------------------------|---------------|------------------|
| Normal | Proliferative | 20 (33.9) |
| | Secretory | 10 (16.9) |
| Endometrial hyperplasia | | 12 (20.3) |
| Endometrial polyp | | 8 (13.6) |
| Endocervical polyp | | 2 (3.4) |
| Submucous myoma | | 1 (1.7) |
| Atrophic endometrium | | 2 (3.4) |
| Endometrial carcinoma | | 2 (3.4) |
| Tubercular endometrium | | 2 (3.4) |
| (Unknown) IUCD | | *Biopsy not done |
| Total | | 59 (100.0) |

[Table/Fig-5]: Histopathological findings.

The details of cross-classifications of histopathological findings is presented in [Table/Fig-6]. with hysteroscopic findings. Out of 18 cases of normal proliferative endometrium diagnosed on hysteroscopy, 15 were confirmed on histopathology. The remaining three were diagnosed as normal secretory endometrium, endometrial hyperplasia and tubercular endometrium. Out of eight cases of normal secretory endometrium on hysteroscopy, seven were confirmed on histopathology. One case was diagnosed as normal proliferative endometrium.

| Findings on Hysteroscopy (Intracavitary) | | Findings on Histopathology | | | | | | | | | |
|--|---------------------|----------------------------|-----|----|----|-----|----|-----|------|------|-------|
| | | NPE | NSE | EH | EP | EcP | SM | AE* | CaE* | TBE* | Total |
| Normal | Proliferative (NPE) | 15 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 18 |
| | Secretory (NSE) | 1 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| Endometrial Hyperplasia (EH) | | 1 | 1 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 12 |
| Endometrial Polyp (EP) | | 1 | 0 | 1 | 8 | 0 | 0 | 0 | 0 | 0 | 10 |
| Submucous Myoma (SM) | | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 3 |
| Endometrial Carcinoma (CAE) | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| Atrophic Endometrium (AE) | | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 3 |
| Endocervical Polyp (EcP) | | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 |
| Endometrial Synechiae (ES) | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Total | | 20 | 10 | 12 | 8 | 2 | 1 | 2 | 2 | 2 | 59 |

[Table/Fig-6]: Cross classification of histopathological findings with hysteroscopic findings.

*AE: Atrophic endometrium; CAE: Endometrial carcinoma; TBE: Tubercular endometrium

Out of 12 cases of endometrial hyperplasia on hysteroscopy, 10 cases were confirmed on histopathology. All cases were of endometrial

| Statistics | NPE | NSE | EH | EP | EcP | SM | AE | CaE |
|---------------------------------|--------|--------|--------|--------|------|--------|--------|------|
| Sensitivity | 75% | 70% | 83.33% | 100% | 100% | 100% | 100% | 100% |
| Specificity | 92.31% | 97.96% | 95.74% | 96.08% | 100% | 96.55% | 98.25% | 100% |
| Positive likelihood ratio | 9.75 | 34.30 | 19.58 | 25.50 | 0 | 29.00 | 57.00 | 0 |
| Negative likelihood ratio | 0.27 | 0.31 | 0.17 | 0 | 0 | 0 | 0 | 0 |
| Diagnostic accuracy | 86.4% | 93.2% | 93.25% | 96.6% | 100% | 96.6% | 98.3% | 100% |
| Positive Predictive Value (PPV) | 83.33% | 87.5% | 83.33% | 80% | 100% | 33.33% | 66.67% | 100% |
| Negative Predictive Value (NPV) | 87.8% | 94.12% | 95.74% | 100% | 100% | 100% | 100% | 100% |

[Table/Fig-7]: Sensitivity, specificity, PPV and NPV of hysteroscopy.

hyperplasia without atypia. No case of atypical endometrial hyperplasia was reported. The other two were found as normal proliferative endometrium and normal secretory endometrium.

Out of 10 cases of endometrial polyp on hysteroscopy 8 were confirmed on histopathology, other two were diagnosed as normal proliferative endometrium and endometrial hyperplasia.

Out of three cases of submucous myoma, one case was confirmed on histopathology and the other two cases were diagnosed as normal endometrium- one proliferative and one secretory.

Two cases of both endometrial carcinoma and endocervical polyp diagnosed on hysteroscopy were confirmed on histopathology.

Three cases of atrophic endometrium were diagnosed on hysteroscopy, two were confirmed on histopathology and the remaining one was diagnosed as normal proliferative endometrium.

Two cases of tubercular endometrium were missed on hysteroscopy which was later confirmed by histopathology.

Performance of hysteroscopy: Use of hysteroscopic diagnostic tests was done for the diagnosis of proliferative endometrium, secretory endometrium, endometrial hyperplasia, endometrial polyp, endocervical polyp, submucous myoma, atrophic endometrium and endometrial carcinoma. Biopsy was taken as a gold standard. Sensitivity, specificity, PPV and NPV values: Evaluation sensitivity, specificity, PPV and NPV of hysteroscopic diagnostic test was done for the diagnosis of Proliferative Endometrium (NPE), Secretory Endometrium (NSE), Endometrial Hyperplasia (EH), Endometrial Polyp (EP), Endocervical Polyp (EcP), Submucous Myoma (SM), Atrophic Endometrium (AE) and Endometrial Carcinoma (CaE) [Table/Fig-7].

Out of 60 cases 26 were found to be normal on hysteroscopy. Histopathology confirmed 24 cases. The overall endometrial pathologies were diagnosed by hysteroscopy in 33 cases of which 27 were confirmed on histopathology. So, the overall diagnostic accuracy of hysteroscopy was 86.4%. The sensitivity specificity, PPV and NPV for overall diagnosis of endometrial pathology by hysteroscopy was 93.1%, 80%, 81.8% and 92.3%, respectively.

DISCUSSION

The AUB, an alteration in the volume, pattern, or duration of menstrual blood flow, is the single most common reason for gynaecologic referral. In the present analysis, the majority of the patients were in the perimenopausal age group (41-50) years. Gandotra N et al., in their study observed AUB being most prevalent 69% in 40-50 years age group followed by 15% in 50-60 years age group [10]. Das S and Mondal R found that the most of the women (50.7%) with prevalence of AUB in 31-40 years' age group [11]. Towbin N et al. and Acharya V et al., have also found similar clinical presentations in their studies [12,13]. However, Mishra VV et al., Observed that the most common age of presentation was 18-40 years followed by 41 to 50 years [14].

The HMB was the predominant clinical presentation of AUB in the present study, accounting for 35% of cases. This finding is consistent with various other studies; for example, Sharma P et al., reported that 35% of cases had menorrhagia [15], while Das S and Mondal R

found that 33.3% of cases exhibited this condition [11]. In contrast, a study conducted by Mohamed MI et al., identified menorrhagia as the most common pattern of abnormal bleeding, affecting 65% of the study population [16]. Other studies reported the following rates of menorrhagia: Jaiswar SP et al., 44%, Guin G et al., 30% cases and Singh S et al., 32% cases [17-19].

In the present study, anaemia was present in 40% of cases, unlike the study conducted by, Das S and Mondal R in which 86% had anaemia [11]. This disparity could be because most of the patients presented within the first 6 months of their complaint.

On per vaginal examination, the uterus was found normal in 55% of cases and up to 6-10 weeks in 43.3% of cases. This was a similar finding Guin G et al., studies with normal size uterus in 49% of cases [18].

Evaluation of performance of hysteroscopy: The proliferative endometrium was diagnosed on hysteroscopy as having a smooth surface, pink and thin with poor superficial vascularisation with interrupted, punctate lines. The incidence of normal endometrium in the present study was 43.3% of which 30% were with proliferative and 13.3% were secretory. This was comparable to Singh S et al., which observed 48% of cases with normal endometrium [19].

In the present study, sensitivity, specificity, PPV, NPV and diagnostic accuracy for proliferative endometrium are 75%, 92.31%, 83.3%, 87.8% and 86.4%, respectively.

The secretory endometrium is diagnosed on hysteroscopy as orange, undulating and thick endometrium. The authors found sensitivity, specificity, PPV and NPV to be 70%, 97.96%, 87.5% and 94.12%, respectively and the calculated diagnostic accuracy was 93.2%. Singh S et al., reported results for secretory endometrium with sensitivity, specificity, PPV and NPV of 70.8%, 98.7%, 94.4% and 91.5%, respectively with a diagnostic accuracy of 94.4% [19].

Endometrial hyperplasia is diagnosed by the thickened, oedematous and undulating appearance of the endometrium. A comparison of endometrial hyperplasia results with other studies is shown in [Table/Fig-8] [15,19-21].

Endometrial polyps are small growths in the uterine cavity, seen magnified on hysteroscopy, which were soft, oval and pedunculated

with a smooth surface. Hysteroscopy diagnosed a total 10 cases of endometrial polyp, out of which histopathology confirmed eight cases and missed two cases. This may be due to failure to sample on biopsy as we are not taking hysteroscopic eye-directed biopsy or the inability to differentiate polyp from endometrial hyperplasia and normal late proliferative endometrium on hysteroscopy. Results are compared with other studies in [Table/Fig-9] [15,19,20,22,23]. In the present study, diagnostic accuracy for endocervical polyp (incidence 3.3%) was 100%.

Submucous myoma: Submucous myoma on hysteroscopy looks like a white-coloured bulge, round in shape, with a smooth surface. Hysteroscopy diagnosed three cases of submucous myoma and only one was reported by histopathology. Hysteroscopy is being proven superior in diagnosis over endometrial curettage when visual diagnosis of myoma is concerned. Endometrial biopsy and curettage may have been missed to sample myoma areas. Results of the present study compared with other studies is shown in [Table/Fig-10] [19,22,23].

The atrophic endometrium is seen as pale white or yellow, thin and fragile with petechiae and haemorrhages at some points. A comparison of the present study with other studies is shown in [Table/Fig-11] [11,19,24].

On hysteroscopy endometrial carcinoma appears as hyperplasia with polypoidal growth, with areas of ulceration and haemorrhage with increased vascularity. The diagnostic accuracy of hysteroscopy for carcinoma endometrium was 100% in the present study and the comparison of various parameters of the present study has been shown in [Table/Fig-12] [19,20].

Endometrial synechiae: In the present study, one case (1.7%) had synechiae, diagnosed on hysteroscopy. Singh et al., [19] reported the incidence of synechiae in 2% and 1% cases. The diagnostic accuracy of hysteroscopy for synechiae was 100%. So, the sensitivity, specificity, PPV and NPV were 100% each, which is comparable with Singh S et al. and Kelekci S et al., [19,22]. The histopathological examination of the tissue showed tubercular endometrium, which was missed on hysteroscopy. The tubercular appearance of the endometrium may not be diagnosed because of the masking of typical features by synechiae.

| S. No. | Author | Years | Sensitivity% | Specificity% | PPV% | NPV% | Diagnostic accuracy |
|--------|--------------------------|------------------------|--------------|--------------|------|-------|---------------------|
| 1. | Rustagi M et al., [20] | 2020 | 50 | 80.6 | 25 | 92.6 | 77.1 |
| 2. | Elfayomy AK et al., [21] | 2012 | 56.5 | 91.6 | 72.2 | 84.6 | |
| 3. | Singh S et al., [19] | 2014 | 95 | 91.3 | 73.1 | 98.7 | 73.1 |
| 4. | Sharma P et al., [15] | 2022 | 87.5 | 90.4 | 77.7 | 96.2 | 89 |
| 5. | Present study | July 2021 to June 2023 | 83.3 | 95.74 | 83.3 | 95.74 | 93.2 |

[Table/Fig-8]: Comparison of endometrial hyperplasia results with other studies [15,19-21].

| S. No. | Author | Years | Sensitivity % | Specificity % | PPV% | NPV% | Diagnostic accuracy |
|--------|---|------------------------|---------------|---------------|------|------|---------------------|
| 1. | Singh S et al., [19] | 2014 | 100 | 96.8 | 62.5 | 100 | 62.5 |
| 2. | Sharma P et al., [15] | 2021 | 100 | 95 | 37.5 | 100 | 100 |
| 3. | Rustagi M et al., [20] | 2020 | 94.1 | 69.8 | 50 | 97.4 | 75.7 |
| 4. | Kelekci S et al., [22] | 2005 | 80 | 80 | 100 | 93.9 | 95 |
| 5. | Tajossadat A and Mohammadiazadeh F [23] | 2007 | 93 | 100 | 100 | 95.4 | |
| 6. | Present study | July 2021 to June 2023 | 100 | 96.08 | 80 | 100 | 96.6 |

[Table/Fig-9]: Comparison of results of endometrial polyp with other studies [15,19,20,22,23].

| S. No. | Author | Years | Sensitivity % | Specificity% | PPV% | NPV% | Diagnostic accuracy |
|--------|---|------------------------|---------------|--------------|------|------|---------------------|
| 1 | Kelekci S et al., [22] | 2005 | 100 | 100 | 100 | 100 | 100 |
| 2 | Tajossadat A and Mohammadiazadeh F [23] | 2007 | 100 | 96.4 | 88 | 100 | |
| 3 | Singh S et al., [19] | 2014 | 100 | 95.9 | 42.9 | 100 | 42.9 |
| 4 | Present study | July 2021 to June 2023 | 100 | 96.55 | 33.3 | 100 | 96.6 |

[Table/Fig-10]: Comparison of submucous myoma results with other studies [19,22,23].

| S. No. | Author | Years | Sensitivity % | Specificity % | PPV% | NPV % | Diagnostic accuracy |
|--------|-------------------------|------------------------|---------------|---------------|------|-------|---------------------|
| 1 | Das S and Mondal R [11] | 2020 | 92.3 | 99.2 | 96 | 98.4 | 98 |
| 2 | Edwin R et al., [24] | 2014 | 100 | 95.51 | 20 | 100 | 40 |
| 3 | Singh S et al., [19] | 2014 | 100 | 100 | 100 | 100 | 100 |
| 4 | Present study | July 2021 to June 2023 | 100 | 98.25 | 66.7 | 100 | 98.3 |

[Table/Fig-11]: Comparison of atrophic endometrium results with other studies [11,19,24].

| S. No. | Author | Years | Sensitivity% | Specificity% | PPV% | NPV% | Diagnostic accuracy |
|--------|------------------------|------------------------|--------------|--------------|------|------|---------------------|
| 1 | Singh S et al., [19] | 2014 | 100 | 100 | 100 | 100 | 100 |
| 2 | Rustagi M et al., [20] | | 33.3 | 100 | 100 | 97.1 | 97.1 |
| 3 | Present | July 2021 to June 2023 | 100 | 100 | 100 | 100 | 100 |

[Table/Fig-12]: Comparison of endometrial carcinoma results with other studies [19,20].

Misplaced Copper T (Cu-T) was also detected by hysteroscopy with 100% accuracy. Tubercular endometrium was the only condition missed by hysteroscopic viewing. On hysteroscopy, Singh S et al., detected one (1%) case of tubercular endometritis [19].

Limitation(s)

This study was conducted at a single rural tertiary care centre with a limited sample size, which may affect the generalizability of the findings. Being an observational study, long-term outcomes and causal relationships could not be fully evaluated. The accuracy of diagnostic hysteroscopy is also operator-dependent and influenced by available resources and expertise.

FUTURE PROSPECTS

Future multicentric studies with larger sample sizes and longer follow-up are needed to validate the findings. Comparative studies with other diagnostic modalities may further establish the role of hysteroscopy-guided biopsy in AUB evaluation. Wider implementation and standardization of hysteroscopy in rural healthcare settings may improve early diagnosis and management of endometrial pathology.

CONCLUSION(S)

Hysteroscopy is a simple, safe and valuable procedure for the endometrial evaluation of patients with AUB. The magnified visualisation of endometrium on hysteroscopy is its main advantage and solves many of AUB's diagnostic confusion. Hysteroscopy offers a speedy diagnosis and simultaneous treatment of AUB and avoids unnecessary hysterectomy for AUB in the perimenopausal age group. The present study concludes that hysteroscopy is a reliable diagnostic tool for the assessment of intrauterine pathologies especially focal ones like endometrial and endocervical polyp and submucous myoma, as these are usually missed by blind endometrial curettage.

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