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DIAGNOSTIC ACCURACY OF HYSTEROSCOPY AND AGREEMENT WITH HISTOPATHOLOGY IN WOMEN WITH ABNORMAL UTERINE BLEEDING: A CROSS-SECTIONAL STUDY IN BASRA, IRAQ

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Abstract

Abnormal uterine bleeding is frequent and sometimes disabling with structural, hormonal, systemic and malignant causes. Hysteroscopy can be used to directly inspect the uterine cavity and to biopsy a target, however it cannot be used to replace histopathology in the diagnosis of endometrial hyperplasia, atypia or endometrial carcinoma. Aim to report hysteroscopic and pathological results in women with AUB and to compare overall the correlation between hysteroscopy and pathological results. This was a single-center cross-sectional diagnostic-accuracy study of women of childbearing age presenting with abnormal uterine bleeding and who were treated by hysteroscopy in Basra Maternity and Children Hospital, Basra, Iraq. The index test was hysteroscopy, and reference standard was histopathology. Descriptive data, overall sensitivity, specificity, predictive values, accuracy and Cohen kappa were determined. The analitic cohort in the Results included 125 women; the time of ending the study and the completeness of the histopathological verification needs author verification. Mean age was 40.3 ± 9.7 years. The most common presentation was heavy menstrual bleeding (41.6%). Both hysteroscopy (29.6%) and histopathology (32.0%) showed the most frequent finding endometrial polyps. Based on the reported overall 2 × 2 table, hysteroscopy had a sensitivity of 94.6% (95% CI 88.0%–97.7%), specificity of 81.2% (64.7%–91.1%), positive predictive value of 93.6% (86.8%–97.0%), negative predictive value of 83.9% (67.4%–92.9%), and accuracy of 91.2% (84.9%–95.0%) for detecting any non-normal histopathological finding. Agreement was substantial ($\kappa = 0.77$; $p < 0.001$). Estimates specific to lesions are re-calculable from source data. There was good overall agreement between hysteroscopy and histopathology in this selected hospital cohort, and it was helpful in detecting intracavitary abnormalities. Histopathological examination cannot be omitted for the confirmation of hyperplasia, atypia and malignancy. The estimates of the various lesions made for diagnosis should be checked again prior to submission of the findings for publication.

Keywords: Abnormal Uterine Bleeding; Hysteroscopy; Histopathology; Endometrial Polyp; Diagnostic Accuracy

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Introduction

Abnormal uterine bleeding (AUB) is a frequent reason for women to seek gynecological care and is known to have a significant impact on women's physical, psychological, social and occupational functioning. If the bleeding is persistent or erratic it may result in iron deficiency, anaemia, tiredness, pain, anxiety and loss of quality of life [1]. AUB is a clinical symptom, not a diagnosis and could occur due to a number of structural and non-structural conditions. According to the International Federation of Gynecology and Obstetrics (FIGO) the causes of AUB are classified as follows: PALM-COEIN system. The structural causes are polyp, adenomyosis, leiomyoma, and malignancy or hyperplasia which are included in PALM, while coagulopathy, ovulatory dysfunction, endometrial disorders, iatrogenic causes and causes not otherwise classified are included in COEIN [2].

Risk for these conditions depends on age, menopausal status and risk factors. Post menopausal bleeding, in particular, should be quickly investigated to rule out endometrial hyperplasia or malignancy, particularly in women with risk factors including obesity [3]. In general, the clinical assessment involves history taking, physical examination, exclusion of pregnancy (where appropriate), laboratory investigations and pelvic imaging [4]. Transvaginal ultrasonography has the advantage of being accessible and non-invasive but it can sometimes be unable to identify small focal intracavitary lesions and endometrial thickening can not be used to make a definite histological diagnosis. Therefore, outpatient hysteroscopy is advised when AUB is accompanied by suspected fibroids, polyps or endometrial disease [5].

Hysteroscopy allows for direct visualization of the uterine cavity and allows for biopsy of suspicious areas under direct visualization. It is especially helpful in diagnosis of focal lesions, like endometrial polyps and submucosal fibroids, and may be helpful in diagnosis and treatment in the same procedure [6]. However, the appearance at the hysteroscope cannot be a substitute for a microscopic examination. Visually there may be subtle or non-specific changes with endometrial hyperplasia and early malignancy and hysteroscopy is not a reliable indicator of the presence of cytological atypia [7]. Thus, hysteroscopy and histopathology should be considered complementary means of diagnosis with hysteroscopy helping to detect and localize abnormalities and the histopathology to help make the definitive tissue diagnosis. The data on the diagnostic value of hysteroscopy in Iraqi women with AUB is still scarce especially in Basra [8].

This current cross sectional study was thus conducted to describe the spectrum of hysteroscopy and pathological findings of women with AUB in a specialist hospital in Basra and to assess the validity of these two methods. The major outcome was presence of any non-normal histopathological finding and secondary outcomes were the distribution of particular lesions and where verified, cross-tabulated diagnostic performance measures for particular lesions.

Methods

The study is a single-center cross-sectional diagnostic-accuracy study, which was carried out in the Department of Gynecology at Basra Maternity and Children Hospital, Basra, Iraq, during the period from 1 November 2025 to 30 July 2026. It comprised of 125 consecutive women with abnormal uterine bleeding (AUB) of ≥18 years of age who underwent hysteroscopy and had signed informed consent. AUB included abnormalities in bleeding frequency, regularity, duration, or volume, including heavy menstrual, intermenstrual, prolonged, and postmenopausal bleeding. Those women who had a history of bleeding associated with pregnancy, pelvic infection, contraindications for hysteroscopy, women who were still on hormonal treatment such as tamoxifen, women who were bleeding to make a good evaluation of the uterine cavity, women with incomplete data or insufficient hysteroscopy were excluded.

Demographic, clinical, obstetric, and gynecological information were collected using a standardized form. General, pelvic examination, relevant laboratory investigations and transvaginal ultrasonography were performed in participants. The thickness of the endometrium and any areas that were suggestive of polyps, submucosal fibroids, thickened endometrium or adenomyosis were noted.

A gynecologist performed the hysteroscopy with a 4 mm rigid hysteroscope and normal saline as distension media. Cervical canal and uterine cavities were explored. These findings were subdivided into normal endometrium, endometrial polyp, submucosal fibroid, endometrial hyperplasia, atrophic endometrium and suspected malignancy. Histopathology was used as the reference standard to evaluate the endometrium which was obtained during hysteroscopy.

In the primary analysis, any hysteroscopic or histopathological finding, other than normal, was

considered positive. Using a 2 × 2 contingency table, the sensitivity, specificity, positive and negative predictive values and overall accuracy were computed. The kappa coefficient of Cohen was used to assess the agreement between hysteroscopy and histopathology. All Categorical variables were analyzed by chi-square or Fisher's exact test, and Continuous variables were analyzed by Independent samples t-test. Data were analysed using IBM SPSS Statistics version 26 with significance level at $p \leq 0.05$. There were no missing observations and complete paired results were obtained for all 125 subjects. The study was conducted after obtaining the approval of the Ethics Committee of the Basrah Health Directorate and keeping the confidentiality of the participants.

results

A total of 125 women were analyzed. Hysteroscopy was performed in all 125 participants and tissue samples were sent to histopathological examination. There was no dropout after enrollment, and paired hysteroscopic and histopathological data were available for the primary analysis.

The mean age of the participants was 40.3 ± 9.7 years as shown in Table 1. Majority resided in the cities (61.6%) and the majority (74.4%) were overweight or obese. Over half (56.8%) had a parity of 1-4 and 23.2% were nulliparous. Thirty-eight point four percent stated a history of abortion and 28.0% of the subjects were postmenopausal.

Table 1. Baseline Demographic and Reproductive Characteristics of Participants (N = 125)

Characteristic	Category	n	%
Age, years	Mean ± SD	40.3 ± 9.7	—
Residence	Rural	48	38.4
	Urban	77	61.6
BMI	Normal	32	25.6
	Overweight	51	40.8
	Obese	42	33.6
Parity	Nulliparous	29	23.2
	1–4	71	56.8
	≥5	25	20.0
History of abortion	Yes	48	38.4
	No	77	61.6
Menopausal status	Postmenopausal	35	28.0
	Not postmenopausal	90	72.0

Table 2 indicates that heavy menstrual bleeding (41.6%) was the most common bleeding pattern followed by post-menstrual bleeding (28.0%) and prolonged bleeding (24.0%). Those who were suffering had a mean symptom duration of 7.8 ± 3.9 years. The most common associated symptoms (n, %) were pelvic pain (36.0%), dysmenorrhea (29.6%), dyspareunia (15.2%) and infertility (18.4%).

Table 2. Distribution of Bleeding Patterns and Associated Clinical Symptoms Among Participants (N = 125)

Clinical feature	n or mean ± SD	%
Heavy menstrual bleeding	52	41.6
Intermenstrual bleeding	21	16.8
Prolonged bleeding	30	24.0
Postmenopausal bleeding	35	28.0
Symptom duration, years	7.8 ± 3.9	Mean ± SD
Pelvic pain	45	36.0
Dysmenorrhea	37	29.6
Dyspareunia	19	15.2
Infertility	23	18.4

As observed in Table 3, the most common abnormality found in TVUS, hysteroscopy and histopathology was endometrial polyp (26.4%, 29.6% and 32.0%, respectively). Histopathological

examination also found fibroids in 16.8%, endometrial hyperplasia in 17.6% and carcinoma in 4.0% of the participants. Twenty-eight percent of TVUS, 24.8 percent of hysteroscopy and 25.6 percent of histopathology results were normal.

Table 3. Distribution of Transvaginal Ultrasonographic, Hysteroscopic, and Histopathological Findings (N = 125)

Diagnostic modality	Finding	n	%
Transvaginal ultrasonography (TVUS)	Normal	35	28.0
	Suspected endometrial polyp	33	26.4
	Suspected submucosal fibroid	20	16.0
	Thickened endometrium	27	21.6
	Adenomyosis	10	8.0
Hysteroscopy	Normal endometrium	31	24.8
	Endometrial polyp	37	29.6
	Submucosal fibroid	17	13.6
	Endometrial hyperplasia	21	16.8
	Atrophic endometrium	9	7.2
	Suspicious for malignancy	10	8.0
Histopathology	Normal endometrium	32	25.6
	Endometrial polyp	40	32.0
	Fibroid	21	16.8
	Hyperplasia with atypia	8	6.4
	Hyperplasia without atypia	14	11.2
	Atrophic endometrium	5	4.0
	Carcinoma	5	4.0

Table 4 indicates that hysteroscopy correctly identified 88/93 of the histopathological positive cases and 26/32 of the negative cases. The overall agreement between hysteroscopy and histopathology was high with 6 false positive and 5 false negative results.

Table 4. Cross-tabulation of Hysteroscopic Findings Against Histopathology for Detecting Non-normal Findings

Index-test result	Histopathology positive	Histopathology negative	Total
Hysteroscopy positive	88	6	94
Hysteroscopy negative	5	26	31
Total	93	32	125

The sensitivity (94.6%), positive predictive value (93.6%) and overall accuracy (91.2%) of hysteroscopy were high. The specificity and negative predictive value were 81.2% and 83.9%, respectively. There was significant agreement between the results of the two tests ($\kappa = 0.77$, $p < 0.001$). Any non-normal pathological results (such as atrophic endometrium) were regarded as target-positive for this analysis.

Table 5. Overall Diagnostic Performance of Hysteroscopy Compared with Histopathology

Measure	Estimate (%)	95% Wilson CI (%)
Sensitivity	94.6	88.0–97.7
Specificity	81.2	64.7–91.1
Positive predictive value	93.6	86.8–97.0
Negative predictive value	83.9	67.4–92.9
Accuracy	91.2	84.9–95.0

Table 6 shows that hysteroscopy had high specificity (92.6–98.3%) and NPV (94.4–98.3%) for all lesions. Sensitivity was highest for endometrial polyps (92.5%) and lowest for hyperplasia and malignancy (80.0%).

Table 6. Diagnostic performance of hysteroscopy in detecting endometrial lesions

Value	Endometrial polyp	Fibroid	endometrium hyperplasia	Malignancy
Sensitivity	92.5	85.7	80.0	80.0
Specificity	95.3	97.0	92.6	98.3
PPV	89.2	88.2	76.2	80.0
NPV	96.8	96.2	94.4	98.3
Accuracy	94.4	04.4	90.4	97.6

Discussion

A total of 125 women with abnormal uterine bleeding (AUB) were assessed in this study to assess the diagnostic value of hysteroscopy in their investigation at a specialist hospital in Basra. There was a high prevalence of uterine pathology in this selected hospital-based population as histopathological abnormalities were present in 93 women (74.4%). Single most frequent finding on hysteroscopy was endometrial polyp (29.6%) and histopathology (32.0%).

Combining all the non-normal findings resulted in a hysteroscopy accuracy of 88 out of 93 histopathological abnormal cases and 26 out of 32 normal cases. It had a sensitivity of 94.6%, specificity of 81.2%, PPV of 93.6%, NPV of 83.9% and overall accuracy of 91.2%. There was good agreement between hysteroscopy and histopathology with a Cohen's kappa coefficient of 0.77. Results suggest that hysteroscopy is a useful tool to detect intrauterine abnormalities in a well-selected population of women with AUB.

These results are in line with earlier studies that have shown the usefulness of hysteroscopy in the assessment of intracavitary pathology. So systematic reviews have demonstrated a significant increase in the diagnosis of intrauterine abnormalities, especially endometrial polyps and also submucosal fibroids, by using hysteroscopy [9]. These are focal lesions that can be directly identified, sampled and often change the shape of the uterine cavity. Comparative hospital-based studies also have shown that hysteroscopy is particularly helpful in situations where ultrasonography reveals a focal intracavitary lesion [10]. The current guidelines also include the option of visually guided hysteroscopic biopsy, since there is a risk of missing focal abnormalities if a biopsy is taken blindly [11].

However, this overall diagnostic accuracy needs to be carefully interpreted. Polyps, fibroids, atrophic endometrium, hyperplasia and carcinoma were grouped together under the "abnormal" category. The hysteroscopic picture and clinical significance of these conditions is highly variable. So overall estimates are not necessarily representative of the diagnostic performance of each lesion. While polyps and submucosal fibroids are usually visible at hysteroscopy, the changes in hyperplasia can be diffuse or non-specific, and resemble benign endometrial changes. Likewise, atypical hyperplasia and early carcinoma can be focal or difficult to see [12]. Therefore, it is important to perform histopathology to rule out or confirm the presence of malignancy and to detect cytological atypia.

Eleven discordant results were seen (6 negative/path positive and 5 path negative). Benign cycle-related changes, inflammation, bleeding and endometrial folds can cause false-positive hysteroscopic findings. False negatives can be caused by small, flat, focal lesions and/or poor visualization. Disagreements may also be due to variation in sampling sites, adequacy of tissue samples or the diagnosis used. But the individual diagnosis of these discordant cases was not reported, so no idea of the reasons for discordance and their clinical importance could be gained [13].

The high prevalence of histopathological abnormalities had an effect on the predictive values observed in this study. However, their differences may be due to differences in primary care or less selected population with lower prevalence and spectrum of uterine disease. The fairly large confidence interval for specificity may also be due to the small number of participants with histopathological normal results. Although it was shown that there is good agreement, it is important to stress that hysteroscopy and histopathology should be used as supplementary techniques, and not as alternatives.

Clinically these findings also favor the use of hysteroscopy in women with AUB, especially when the ultrasonography and/or symptoms indicate an endometrial polyp, submucosal fibroid or other intracavitary lesion. Hysteroscopy offers the ability to directly visualize the uterine cavity, to be able to

specifically sample tissues, and can possibly allow for diagnosis and treatment in the same session [14]. Histopathology should still be the definitive diagnostic tool, however, where pre-malignant/malignant disease is suspected. This is important, as 28.0% of the subjects of the study were postmenopausal, and 74.4% overweight or obese, which are known to be risk factors for careful evaluation of the endomyometrium [15,16].

This study provides diagnostic evidence from Basra which is underrepresented in the literature and complete paired hysteroscopic and histopathology results have been included for all the study participants. But there are, of course, certain caveats. Single-center and hospital-based population may have restriction of generalizability. A formal sample-size calculation was not done and the number of women with carcinoma or atypical hyperplasia was also small. Information on biopsy technique, criteria for tissue adequacy, pathological classification, experience of the operator and blinding was not provided. Furthermore, the diagnostic accuracy for each lesion was not possible to assess in absence of individual patient-level cross tabulations for each condition.

A standardized biopsy and histopathological protocol, blinded assessment and a priori sample-size calculation in future multicenter prospective studies should be used to define the hysteroscopic criteria. Diagnostic measures should be reported with 95% confidence intervals for lesions, especially for polyps, fibroids, hyperplasia and carcinoma. Patient acceptability, complications, same-visit treatment and cost-effectiveness must also be further studied to better understand the overall clinical utility of hysteroscopy in women with AUB.

Conclusion

Hysteroscopy was highly sensitive and accurate for detection of uterine abnormalities in women with AUB and there was substantial agreement with histopathology. It was very useful for the detection of focal intracavitary lesions. But, the final diagnosis of hyperplasia, atypia and malignancy still depends on the histopathological examination. Hence, it is suggested that hysteroscopy and histopathology should be used as complementary diagnostic tools.

REFERENCE

1. M. G. Munro, H. O. D. Critchley, M. S. Broder, and I. S. Fraser, “FIGO classification system (PALM–COEIN) for causes of abnormal uterine bleeding in nongravid women of reproductive age,” Int. J. Gynaecol. Obstet., vol. 113, no. 1, pp. 3–13, 2011, doi: 10.1016/j.ijgo.2010.11.011.

2. M. G. Munro, H. O. D. Critchley, and I. S. Fraser, “The two FIGO systems for normal and abnormal uterine bleeding symptoms and classification of causes of abnormal uterine bleeding in the reproductive years: 2018 revisions,” Int. J. Gynaecol. Obstet., vol. 143, no. 3, pp. 393–408, 2018, doi: 10.1002/ijgo.12666.

3. I. S. Fraser, H. O. D. Critchley, M. Munro, and M. Broder, “A process designed to lead to international agreement on terminologies and definitions used to describe abnormalities of menstrual bleeding,” Fertil. Steril., vol. 87, no. 3, pp. 466–476, 2017, doi: 10.1016/j.fertnstert.2007.01.023.

4. L. Whitaker and H. O. D. Critchley, “Abnormal uterine bleeding,” Best Pract. Res. Clin. Obstet. Gynaecol., vol. 34, pp. 54–65, 2016, doi: 10.1016/j.bpobgyn.2015.11.012.

5. T. J. Clark, D. Voit, J. K. Gupta, C. Hyde, F. Song, and K. S. Khan, “Accuracy of hysteroscopy in the diagnosis of endometrial cancer and hyperplasia: A systematic quantitative review,” JAMA, vol. 288, no. 13, pp. 1610–1621, 2022, doi: 10.1001/jama.288.13.1610.

6. H. van Dongen, C. D. de Kroon, C. E. Jacobi, J. B. Trimbos, and F. W. Jansen, “Diagnostic hysteroscopy in abnormal uterine bleeding: A systematic review and meta-analysis,” BJOG, vol. 114, no. 6, pp. 664–675, 2021, doi: 10.1111/j.1471-0528.2007.01326.x.

7. F. Gkrozou et al., “Hysteroscopy in women with abnormal uterine bleeding: A meta-analysis on four major endometrial pathologies,” Arch. Gynecol. Obstet., vol. 291, no. 6, pp. 1347–1354, 2015, doi:

10.1007/s00404-014-3585-x.

8. G. Garuti, I. Sambruni, M. Colonnelli, and M. Luerti, “Accuracy of hysteroscopy in predicting histopathology of the endometrium in 1500 women,” J. Am. Assoc. Gynecol. Laparosc., vol. 8, no. 2, pp. 207–213, 2020, doi: 10.1016/S1074-3804(05)60579-8.

9. G. Garuti, F. Cellani, G. Garzia, M. Colonnelli, and M. Luerti, “Accuracy of hysteroscopic diagnosis of endometrial hyperplasia: A retrospective study of 323 patients,” J. Minim. Invasive Gynecol., vol. 12, no. 3, pp. 247–253, 2015, doi: 10.1016/j.jmig.2005.03.006.

10. E. Epstein, A. Ramirez, L. Skoog, and L. Valentin, “Transvaginal sonography, saline contrast sonohysterography and hysteroscopy for the investigation of women with postmenopausal bleeding and endometrium greater than 5 mm,” Ultrasound Obstet. Gynecol., vol. 18, no. 2, pp. 157–162, 2011, doi: 10.1046/j.1469-0705.2001.00472.x.

11. T. J. Clark, J. K. Gupta, and K. S. Khan, “Evaluation of outpatient hysteroscopy and ultrasonography in the diagnosis of endometrial disease,” Obstet. Gynecol., vol. 99, no. 6, pp. 1001–1007, 2012, doi: 10.1016/S0029-7844(02)01961-4.

12. R. Smith-Bindman, K. Kerlikowske, V. A. Feldstein et al., “Endovaginal ultrasound to exclude endometrial cancer and other endometrial abnormalities,” JAMA, vol. 280, no. 17, pp. 1510–1517, 2014, doi: 10.1001/jama.280.17.1510.

13. M. A. Clarke et al., “Association of endometrial cancer risk with postmenopausal bleeding in women: A systematic review and meta-analysis,” JAMA Intern. Med., vol. 178, no. 9, pp. 1210–1222, 2018, doi: 10.1001/jamainternmed.2018.2820.

14. American College of Obstetricians and Gynecologists, “The role of transvaginal ultrasonography in evaluating the endometrium of women with postmenopausal bleeding: ACOG Committee Opinion No. 734,” Obstet. Gynecol., vol. 131, no. 5, pp. e124–e129, 2018, doi: 10.1097/AOG.0000000000002631.

15. American College of Obstetricians and Gynecologists, “Diagnosis of abnormal uterine bleeding in reproductive-aged women: Practice Bulletin No. 128,” Obstet. Gynecol., vol. 120, no. 1, pp. 197–206, 2012, doi: 10.1097/AOG.0b013e318262e320.

16. National Institute for Health and Care Excellence, “Heavy menstrual bleeding: Assessment and management,” NICE Guideline NG88, London, U.K., 2018, updated May 24, 2021. [Online]. Available: NICE NG88. [Accessed: Sep. 10, 2026].