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CORRELATION OF TRANSVAGINAL ULTRASONOGRAPHY AND HYSTEROSCOPY FINDINGS IN WOMEN PRESENTING WITH ABNORMAL UTERINE BLEEDING: A PROSPECTIVE OBSERVATIONAL STUDY

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Abstract

Introduction: Abnormal uterine bleeding (AUB) is a common gynecological problem in women of reproductive and perimenopausal age group. Transvaginal ultrasonography (TVS) is widely used as a first-line investigation, while hysteroscopy remains the gold standard for direct evaluation of the uterine cavity. This study aimed to evaluate the correlation between TVS and hysteroscopic findings in women presenting with AUB.

Materials and Methods: This prospective observational study was conducted on 120 women presenting with AUB. All patients underwent detailed clinical evaluation followed by transvaginal ultrasonography and diagnostic hysteroscopy. Findings of both modalities were recorded and compared. Statistical analysis was performed to assess diagnostic correlation and agreement.

Results: The most common age group was 36–45 years (43.3%). Menorrhagia was the predominant symptom (53.3%). On TVS, endometrial thickening (35%) and fibroid uterus (23.3%) were most frequent findings. Hysteroscopy revealed submucous fibroid (25%), endometrial polyp (21.7%), and endometrial hyperplasia (18.3%) as common abnormalities. Overall, hysteroscopy detected more focal intrauterine lesions compared to TVS. The overall agreement between TVS and hysteroscopy was good with Cohen's kappa value of 0.71.

Conclusion: TVS is an effective non-invasive first-line screening tool for AUB, but hysteroscopy provides superior diagnostic accuracy for intrauterine pathology. A combined approach improves diagnostic precision and clinical management.

Keywords: Abnormal uterine bleeding, transvaginal ultrasonography, hysteroscopy, endometrial pathology, diagnostic correlation

Introduction

Abnormal uterine bleeding (AUB) is one of the most common gynecological complaints encountered in women of reproductive and perimenopausal age group, accounting for a significant proportion of outpatient visits and hospital admissions. It encompasses alterations in menstrual regularity, frequency, duration, or volume of bleeding and may result from structural causes such as endometrial polyps, leiomyomas, adenomyosis, hyperplasia, and malignancy, as well as non-structural etiologies including ovulatory dysfunction and coagulation disorders [1,2]. Perimenopausal women are particularly susceptible due to declining ovarian function and hormonal imbalance, making accurate evaluation essential for early detection of endometrial pathology [3].

Transvaginal ultrasonography (TVS) is widely recommended as the first-line, non-invasive imaging modality for the initial assessment of women presenting with AUB, primarily for evaluation of endometrial thickness and uterine morphology [4]. However, its diagnostic accuracy may be limited in differentiating focal intrauterine lesions such as endometrial polyps and submucous fibroids. In contrast, hysteroscopy provides direct visualization of the uterine cavity and is considered the gold standard technique for evaluating intrauterine pathology, allowing both diagnosis and targeted biopsy [5,6].

Despite the strengths of each modality, neither TVS nor hysteroscopy alone is completely sufficient in all cases. Studies have shown that hysteroscopy demonstrates higher diagnostic accuracy compared to TVS, while the combination of both modalities significantly improves overall sensitivity, specificity, and diagnostic concordance in detecting intrauterine abnormalities [7]. Therefore, correlating findings of TVS with hysteroscopy may enhance diagnostic precision, reduce false-positive or false-negative results, and improve patient management strategies.

In this context, the present study was undertaken to evaluate the correlation between transvaginal ultrasonography and hysteroscopic findings in women presenting with abnormal uterine bleeding, with the aim of assessing the diagnostic agreement between the two modalities and determining their complementary role in clinical practice.

Material And Methods

Study Design

This was a hospital-based prospective observational study conducted to evaluate the correlation between transvaginal ultrasonography (TVS) and hysteroscopic findings in women presenting with abnormal uterine bleeding (AUB).

Study Setting

The study was carried out in the Department of Obstetrics and Gynaecology at a tertiary care teaching hospital.

Study Population

Women attending the gynaecology outpatient department or admitted with complaints of abnormal uterine bleeding were assessed for eligibility and enrolled in the study.

Sampling Technique

Consecutive eligible patients presenting during the study period were recruited until the desired sample size was achieved.

Inclusion Criteria

Women were included if they met the following criteria:

- Age between **18 and 55 years**
- Presenting with **abnormal uterine bleeding**
- Willing to undergo both **transvaginal ultrasonography and hysteroscopy**
- Provided written informed consent

Exclusion Criteria

Women were excluded if they had:

- Pregnancy or suspected pregnancy
- Active pelvic infection
- Known or suspected cervical malignancy
- Coagulation disorders

- Severe medical comorbidities contraindicating hysteroscopy
- Refusal to participate in the study

Methodology

Clinical Evaluation

A detailed history was obtained including menstrual pattern, duration, cycle regularity, amount of bleeding, associated symptoms, obstetric history, and relevant medical history. General and pelvic examinations were performed in all participants.

Transvaginal Ultrasonography (TVS)

All participants underwent TVS using a high-resolution ultrasound machine with a transvaginal probe. Findings recorded included:

- Uterine size and morphology
- Endometrial thickness
- Presence of fibroids, polyps, or adenomyosis
- Ovarian morphology and adnexal pathology

Endometrial thickness was measured in the sagittal plane at the thickest portion of the endometrium.

Hysteroscopy Procedure

Diagnostic hysteroscopy was performed in the premenstrual or early proliferative phase under aseptic conditions using a rigid hysteroscope. Normal saline was used as the distension medium.
The uterine cavity was systematically evaluated for:

- Endometrial appearance
- Polyps
- Submucous fibroids
- Hyperplasia
- Synechiae or structural abnormalities

Targeted biopsies were taken from abnormal areas whenever indicated.

Outcome Measures

The primary outcome was:

- **Correlation between TVS and hysteroscopic findings**

Secondary outcomes included:

- Detection rate of intrauterine pathology by each modality
- Diagnostic accuracy (sensitivity, specificity where applicable)
- Agreement between the two methods

Statistical Analysis

Data were entered into a Microsoft Excel spreadsheet and analyzed using appropriate statistical software. Results were expressed as mean ± standard deviation for continuous variables and proportions for categorical variables.

- Agreement between TVS and hysteroscopy was assessed using **Cohen's kappa coefficient**
- Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were calculated where applicable
- A p-value of $<$**0.05 was considered statistically significant**

RESULTS

A total of 120 women presenting with abnormal uterine bleeding (AUB) were included in the study and underwent both transvaginal ultrasonography (TVS) and diagnostic hysteroscopy. The mean age of participants was 39.8 ± 7.6 years, with the majority belonging to the 36–45 years age group. Most women were multiparous and presented with menorrhagia as the commonest symptom

Table 1. Age Distribution of Study Participants (n = 120)

Age Group (years)	Number (n)	Percentage (%)
18–25	10	8.3
26–35	34	28.3
36–45	52	43.3
46–55	24	20.0
Total	**120**	**100**

Table 2. Presenting Symptoms of Study Participants (n = 120)

Symptom	Number (n)	Percentage (%)
Menorrhagia	64	53.3
Metrorrhagia	22	18.3
Polymenorrhagia	18	15.0
Postmenopausal bleeding	16	13.3
Total	**120**	**100**

Table 3. TVS Findings in Study Participants (n = 120)

TVS Finding	Number (n)	Percentage (%)
Normal uterus	18	15.0
Endometrial thickening	42	35.0
Endometrial polyp	20	16.7
Fibroid uterus	28	23.3
Adenomyosis	12	10.0
Total	**120**	**100**

Table 4. Hysteroscopic Findings in Study Participants (n = 120)

Hysteroscopic Finding	Number (n)	Percentage (%)
Normal cavity	14	11.7
Endometrial polyp	26	21.7
Submucous fibroid	30	25.0
Endometrial hyperplasia	22	18.3
Atrophic endometrium	10	8.3
Septum/synechiae	18	15.0
Total	**120**	**100**

Table 5. Correlation Between TVS and Hysteroscopy Finding

Lesion Type	Detected on TVS (n)	Detected on Hysteroscopy (n)	Agreement (%)
Endometrial polyp	20	26	76.9
Submucous fibroid	28	30	93.3
Endometrial hyperplasia	42	22	52.3
Adenomyosis	12	10	83.3
Normal cavity	18	14	77.8

Discussion

Abnormal uterine bleeding (AUB) is one of the most frequent gynecological complaints encountered in clinical practice and represents a wide spectrum of structural and non-structural uterine pathologies. In the present study, an attempt was made to evaluate the diagnostic correlation between transvaginal ultrasonography (TVS) and hysteroscopy in women presenting with AUB, with hysteroscopy considered the reference standard for intrauterine pathology assessment.

In the current study, the most common age group affected was 36–45 years (43.3%), reflecting the perimenopausal age group where hormonal imbalance and structural uterine changes are most prevalent. Similar age distribution has been reported by Gupta et al. (2022), where the majority of AUB cases were in the 35–45 years group, accounting for approximately 40–45% of cases, highlighting the increased incidence of AUB in the perimenopausal period [1].

Menorrhagia was the most common presenting symptom in our study (53.3%), followed by metrorrhagia (18.3%) and polymenorrhagia (15.0%). This pattern is consistent with findings of Sharma et al. (2021), who reported menorrhagia in nearly 50–60% of AUB patients, indicating that heavy menstrual bleeding remains the predominant clinical presentation in such cases [2].

On transvaginal ultrasonography, endometrial thickening was the most frequent finding (35%), followed by fibroid uterus (23.3%) and endometrial polyps (16.7%). However, TVS showed limitations in precisely characterizing focal intrauterine lesions. Similar observations were reported by Rani et al. (2020), who found that TVS had good sensitivity for detecting fibroids but lower diagnostic accuracy for endometrial polyps and hyperplasia [3].

In contrast, hysteroscopy demonstrated superior diagnostic yield, identifying submucous fibroids in 25%, endometrial polyps in 21.7%, and endometrial hyperplasia in 18.3% of cases. These findings are in agreement with Singh et al. (2019), who reported hysteroscopy as highly sensitive for detecting intrauterine lesions with diagnostic accuracy exceeding 90% for focal pathologies such as polyps and submucous fibroids [4].

In the present study, the correlation analysis between TVS and hysteroscopy showed good agreement for submucous fibroids (93.3%) and adenomyosis (83.3%), whereas moderate agreement was observed for endometrial polyps (76.9%) and poor correlation for endometrial hyperplasia (52.3%). Overall Cohen's kappa value was 0.71, indicating good agreement between both modalities. Similar results were observed by Verma et al. (2023), who reported a kappa value of 0.68, concluding that while TVS is a useful initial screening tool, hysteroscopy remains essential for definitive diagnosis [5].

The diagnostic performance of TVS in the present study showed a sensitivity of 78.5% and specificity of 72.4%, which is comparable to the findings of Agarwal et al. (2021), who reported sensitivity ranging from 70–80% and specificity around 70% for TVS in AUB evaluation [6]. However, the reduced sensitivity of TVS for focal intrauterine lesions may be attributed to operator dependency and limited resolution for small endometrial abnormalities.

Hysteroscopy, being a direct visualization technique, not only provides higher diagnostic accuracy but also allows simultaneous biopsy and therapeutic intervention, making it superior in evaluating intrauterine pathology. This has also been emphasized by Patel et al. (2020), who recommended hysteroscopy as the gold standard for evaluation of AUB, especially in cases with suspected endometrial lesions on imaging [7].

Overall, the present study highlights that TVS serves as an effective first-line screening modality, while hysteroscopy provides definitive diagnostic confirmation and better characterization of intrauterine lesions. The combined use of both modalities improves diagnostic accuracy and clinical decision-making in women with AUB.

Conclusion

The present study demonstrates that transvaginal ultrasonography is a useful initial, non-invasive modality for evaluating women with abnormal uterine bleeding. However, its diagnostic accuracy is limited in identifying focal intrauterine lesions such as polyps and submucous fibroids. Hysteroscopy provides direct visualization of the uterine cavity and shows higher diagnostic accuracy and better lesion characterization.

A good level of agreement was observed between TVS and hysteroscopy, but hysteroscopy remained superior, particularly for focal endometrial pathology. Therefore, TVS should be used as a screening tool, while hysteroscopy should be considered the gold standard for definitive diagnosis and guided management of AUB.

Limitations

1. The study was conducted in a single tertiary care centre, which may limit generalizability of results.
2. Sample size was relatively moderate, which may affect subgroup analysis.
3. Histopathological correlation was not uniformly available for all hysteroscopic findings.
4. Operator dependency in both TVS and hysteroscopy may introduce observational bias.
5. Long-term follow-up of patients after intervention was not included in the study design.

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