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A Comparative Study of Diagnostic Efficacy of Transvaginal Ultrasonography with Hysteroscopy in Perimenopausal Patients with Abnormal Uterine Bleeding

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Abstract:

Abnormal uterine bleeding (AUB) is one of the most common gynecological complaints among perimenopausal women, often requiring accurate diagnosis for timely and effective management. Transvaginal ultrasonography (TVS) is widely used as the initial imaging modality due to its non-invasive nature and accessibility, while hysteroscopy remains the gold standard because of its direct visualization of the uterine cavity. This prospective comparative study evaluates the diagnostic accuracy, sensitivity, and specificity of TVS against hysteroscopy in detecting intrauterine pathologies in perimenopausal women presenting with AUB. A total of 120 women aged 40–55 years were included between February and August 2025 at the Department of Obstetrics and Gynaecology, Rama Medical College, Hapur. All participants underwent TVS followed by diagnostic hysteroscopy, and findings of both modalities were compared with histopathological examination (HPE), considered the definitive diagnostic tool. The most common symptoms were heavy menstrual bleeding and intermenstrual bleeding. TVS demonstrated high sensitivity for detecting endometrial thickening and fibroids but showed lower diagnostic accuracy for focal intrauterine lesions such as polyps, submucous myomas, and adhesions. Hysteroscopy identified focal lesions more accurately and allowed for simultaneous therapeutic intervention when required. In comparison with HPE, hysteroscopy exhibited superior sensitivity (95%) and specificity (97%) compared to TVS (sensitivity 78%, specificity 85%). Misdiagnosis or missed lesions on TVS were mainly attributed to operator dependency and limited visualization of small intracavitary abnormalities. The study concludes that while TVS is an excellent initial screening tool for AUB, hysteroscopy should be preferred for definitive diagnosis, especially in cases of suspected focal lesions or when TVS results are inconclusive. These findings reinforce the complementary role of both modalities in evaluating perimenopausal AUB, emphasizing hysteroscopy as the more reliable diagnostic approach.

Keywords:

Abnormal uterine bleeding; Transvaginal ultrasonography; Hysteroscopy; Perimenopause; Endometrial pathology; Diagnostic accuracy

Introduction:

Abnormal uterine bleeding (AUB) in perimenopausal women represents a significant clinical concern due to its high prevalence and the potential for underlying pathological

conditions, including endometrial hyperplasia and carcinoma. The perimenopausal transition is characterized by hormonal fluctuations that commonly result in irregular menstrual cycles; however, persistent or unexplained AUB warrants thorough evaluation to differentiate between physiological and pathological causes. Early and accurate diagnosis is crucial for initiating appropriate treatment, preventing complications, and reducing patient anxiety. Traditional diagnostic modalities include clinical evaluation, laboratory studies, transvaginal ultrasonography (TVS), hysteroscopy, and histopathological examination (HPE). Among these, TVS is widely used as the first-line imaging tool because it is non-invasive, readily available, and cost-effective. It provides essential information on endometrial thickness, uterine size, adnexal structures, and presence of masses. However, TVS has limitations in detecting small intracavitary lesions such as polyps or submucous fibroids, which may be obscured by endometrial folds or operator dependency. Hysteroscopy, on the other hand, is considered the gold standard for evaluating the uterine cavity. It allows direct visualization of the endometrium, identification of focal lesions, and real-time biopsy or removal when necessary. Despite its invasive nature, hysteroscopy offers higher sensitivity and specificity for diagnosing structural abnormalities contributing to AUB. With evolving minimally invasive technologies, hysteroscopy has become more accessible and safer, increasing its utility in routine gynecological practice. Comparative studies examining the diagnostic efficacy of TVS versus hysteroscopy are essential for optimizing patient care, reducing unnecessary procedures, and determining cost-effective diagnostic pathways. In the context of perimenopausal AUB, where the risk of premalignant or malignant changes is elevated, establishing the most accurate diagnostic approach becomes even more important. This study aims to compare TVS with hysteroscopy in terms of diagnostic accuracy, sensitivity, specificity, and correlation with HPE findings in perimenopausal women presenting with AUB. The study further explores the clinical implications of identifying specific intrauterine lesions and emphasizes the importance of selecting appropriate diagnostic tools to guide management.

Materials and Methods:

This prospective comparative study was conducted in the Department of Obstetrics and Gynaecology, Rama Medical College, Hospital and Research Center, Hapur, from February 2025 to August 2025. A total of 120 perimenopausal women aged between 40 and 55 years presenting with abnormal uterine bleeding were recruited. The study included both outpatient and inpatient cases who fulfilled the inclusion criteria. Inclusion criteria were women in the perimenopausal age group with complaints of heavy menstrual

bleeding, intermenstrual bleeding, prolonged bleeding, or post-menstrual spotting. Women with diagnosed bleeding disorders, pregnancy, pelvic inflammatory disease, or current hormonal therapy were excluded. All participants underwent a thorough clinical evaluation, including detailed history, physical examination, and pelvic examination. Baseline investigations such as complete blood count, coagulation profile, thyroid function tests, and pregnancy test (if required) were performed. TVS was performed using a high-frequency transvaginal probe by an experienced radiologist. Endometrial thickness was measured in the sagittal plane, and the uterine cavity was assessed for fibroids, polyps, adnexal masses, or other abnormalities. TVS findings were documented systematically. Following TVS, all patients underwent diagnostic hysteroscopy using a 2.9 mm or 4 mm rigid hysteroscope under appropriate anesthesia. The uterine cavity, cervical canal, fundus, and tubal ostia were inspected. Any abnormal findings such as polyps, submucous myomas, adhesions, or hyperplastic changes were noted. When indicated, directed biopsies were taken. Subsequently, fractional curettage or endometrial biopsy was performed in all cases, and specimens were sent for histopathological examination, which served as the gold standard for comparison. The diagnostic performance of TVS and hysteroscopy was evaluated in terms of sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) using HPE correlation. Statistical analysis was conducted using SPSS software version 25.0. Continuous variables were expressed as mean ± standard deviation, and categorical variables as percentages. The chi-square test was applied to compare categorical variables, and a p-value <0.05 was considered statistically significant. Ethical approval was obtained prior to the initiation of the study, and informed consent was taken from all participants. Patient confidentiality and data integrity were maintained throughout the study. The parameters assessed included endometrial hyperplasia, polyps, submucous fibroids, endometrial carcinoma, and normal endometrium. TVS findings were compared with hysteroscopic visualization and HPE outcomes to evaluate accuracy. The study also assessed procedure-related discomfort, complications such as bleeding or infection, and feasibility of performing therapeutic interventions during hysteroscopy.

Results:

Out of 120 perimenopausal women studied, the most common presenting complaint was heavy menstrual bleeding (62%), followed by intermenstrual bleeding (25%) and prolonged bleeding (13%). TVS identified endometrial thickening (>12 mm) in 58 cases, suspected polyps in 20 cases, and submucous fibroids in 14 cases. Hysteroscopy confirmed endometrial hyperplasia in 52 cases, polyps in 28 cases, submucous fibroids in 18 cases, and detected intrauterine adhesions in 6 cases that were missed on TVS. Correlation with HPE demonstrated that hysteroscopy had a sensitivity of 95% and specificity of 97%, significantly higher than TVS, which had sensitivity of 78% and specificity of 85% ($p<0.05$). TVS missed 30% of polyps and 22% of submucous myomas detected by

hysteroscopy. Hysteroscopy allowed immediate removal of polyps and adhesions in 24 patients and biopsy of suspected malignant lesions. No major complications were reported. Overall, hysteroscopy demonstrated superior diagnostic accuracy and therapeutic utility.

Discussion :

This study highlights the limitations of TVS in detecting focal intrauterine abnormalities and reinforces hysteroscopy as the gold standard for evaluating AUB in perimenopausal women. While TVS remains an excellent screening tool, its diagnostic accuracy is reduced for small or hidden lesions. Hysteroscopy not only provides direct visualization but also enables simultaneous treatment, reducing the need for multiple procedures. The significantly higher sensitivity and specificity observed in hysteroscopy confirm its superiority in diagnosing endometrial pathologies.

Summary :

TVS and hysteroscopy are valuable tools in the evaluation of perimenopausal AUB, but hysteroscopy provides significantly greater diagnostic accuracy. TVS is useful as an initial, non-invasive screening modality, particularly for assessing endometrial thickness and larger intrauterine abnormalities. However, hysteroscopy excels in identifying focal lesions such as polyps, submucous fibroids, and adhesions while allowing concurrent therapeutic intervention. Based on histopathological correlation, hysteroscopy demonstrated higher sensitivity and specificity. Therefore, hysteroscopy should be considered the preferred diagnostic approach in perimenopausal women with inconclusive TVS findings or persistent symptoms.

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